

OIL AND GAS DEVELOPMENTS IN PENNSYLVANIA IN 1979

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TOPOGRAPHIC AND GEOLOGIC SURVEY
Arthur A. Socolow, State Geologist

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ABSTRACT

Oil production in 1979 totaled 2,816,682 barrels, 3,060 barrels below the 2,819,742 barrels produced in 1978. Oil reserves increased from 48,156,000 barrels in 1978 to 50,845,000 barrels in 1979, a 6 percent increase. Leading counties for oil production were McKean, Venango, and Warren; these also have the largest reserves. In 1979, secondary waterflood production in the Bradford field accounted for 56 percent of the statewide oil production. Two new waterflood projects were begun during the year: the Highland Warrant project in the Sackett field, Elk County, and the Tally Ho project in the Guffey field, McKean County. Two old tertiary projects remained active, the Penn Grade Micellar Displacement project at Derrick City and the experimental Maraflood project at Cyclone. A third tertiary project was begun adjacent to the Maraflood project at Cyclone. All of these tertiary projects are in the Bradford field.

Gas production decreased to 96,313 million cubic feet in 1979 from 97,763 million cubic feet in 1978, a 1.5 percent decrease. Gas reserves, including stored recoverable gas, increased from 2,093,516 million cubic feet in 1978 to 2,251,312 million cubic feet in 1979, up 7.5 percent.

The price of Penn Grade Crude oil ranged from \$14.77 per barrel at the beginning of 1979 to \$38.00 per barrel by year's end. This was an increase of 157 percent. The wellhead price paid per thousand cubic feet for natural gas during the year ranged from \$0.30 per thousand cubic feet under old contracts to as high as \$2.60 per thousand cubic feet for stripper gas. The maximum price paid for new gas was \$2.17. Ceiling prices for natural gas are set by the Natural Gas Policy Act.

The total number of wells completed in Pennsylvania in 1979 was 1,941, an increase of 193 wells (11 percent) over 1978. Total footage drilled was 4,832,383, an increase of 5 percent over 1978 (4,581,717 feet). In 1979, 757 oil wells were completed. This is an increase of 200 wells or 36 percent compared to 1978. The three most active counties in oil well drilling were Venango, Warren, and Forest, where approximately 99 percent of all oil wells were drilled. There was also a large increase in oil-related service wells during the year. A total of 1,043 gas wells were completed in 1979, which is a decrease of 62 wells or 6 percent over 1978. The five most active counties in gas well drilling were Indiana, Jef-

ferson, Erie, Westmoreland, and Armstrong, where approximately 8 percent of all gas wells were drilled.

Exploratory wells drilled to find and produce hydrocarbons in unproved areas decreased from 97 wells, comprising 378,486 feet of hole, in 1978 to 69 wells, comprising 286,410 feet of hole, in 1979, a decrease of 27 percent in wells and 24 percent in footage. There were 22 gas discoveries and 1 oil discovery in 1979.

Seismic exploration activity decreased slightly from 30.95 crew-months in 1978 to 29.78 crew-months in 1979. Seismic crews operated in 11 counties in Pennsylvania during the year.

INTRODUCTION

Pennsylvania oil and gas statistics reported here are based on drillers' records and location plats filed with the Oil and Gas Regulatory Division of the Bureau of Topographic and Geologic Survey, the administrative and regulatory agency for the oil and gas laws. Only those wells are reported for which records and plats have been received within the year. This includes wells drilled in prior years for which records were submitted and received in 1979. It does not include 1979 wells for which records had not been submitted within the year. Oil production and reserves data and gas production and reserves data shown in Figures 1 through 7 were obtained from the American Petroleum Institute and the American Gas Association, respectively.

ACKNOWLEDGEMENTS

We appreciate the cooperation of the Oil and Gas Regulatory Division of the Bureau of Topographic and Geologic Survey, Pennsylvania Department of Environmental Resources, in sharing drillers' logs submitted to them by the operators under the oil and gas law.

We also appreciate the help of the Pennsylvania Game Commission, the American Gas Association, the American Petroleum Institute, Petroleum Information Corporation, Pittsburgh Oil Scouts Association, the Division of Minerals of the Bureau of Forestry, Pennsylvania Department of Environmental Resources, and the Bureau of Statistics, Pennsylvania Department of Commerce.

Thanks are extended to all operators and companies who released natural gas production statistics and other data.

Cheryl L. Cozart of the Oil and Gas Geology Division, Bureau of Topographic and Geologic Survey, assisted in the compilation of this report.

PRODUCTION AND RESERVES

OIL PRODUCTION

In 1979, a total of 2,816,682 barrels (bbl) of oil was produced from Upper Devonian and Silurian sandstones, compared to 2,819,742 bbl of oil in 1978. Included in that total is the production of crude oil formerly designated as "Corning Grade" from Medina (Lower Silurian) sandstones in Erie and Crawford Counties, amounting to 70,440 bbl, up 8,824 bbl from 1978. All oil produced in Pennsylvania is now designated Penn Grade Crude. Production of natural gas liquids decreased 15 percent in 1979 (Figure 1).

Figure 1. Oil production in Pennsylvania, 1979

	1979	1978	% Change (1,000 barrels)	Cumulative to 12/31/79
Penn Grade	2,817	2,820	0	1,297,755
Natural gas liquids	57	67	-15	

Figure 2 shows the amount of oil production and total number of producing wells by county. The total oil production in the two figures differs because Figure 1 is based on actual oil produced whereas Figure 2 is based on oil shipped or sold. The leading counties for oil production in 1979 were McKean, Venango, and Warren Counties, which together produced approximately 79 percent of the total oil produced in Pennsylvania.

DEVELOPED OIL RESERVES

Total developed reserves of oil in the Commonwealth at the end of 1979 increased 6 percent from 1978. The counties that had the greatest reserves were McKean, Venango, and Warren. New reserves were added in McKean and Elk Counties. Reserves of natural gas liquids fell 18 percent. Figure 3 summarizes proved reserves in 1979 and 1978.

SECONDARY AND TERTIARY OIL RECOVERY PROJECTS

Eighty-four service wells were drilled in 1979 compared to 21 in 1978 and only 8 in 1977. This included 1 gas-storage observation well in Potter County, and 83 water- or gas-injection wells; 59 wells in McKean County, 20

Figure 2. Oil wells and crude oil produced in Pennsylvania in 1978 and 1979, by counties*

County	Crude oil production (barrels)		Number of producing oil wells	
	1979	1978	12/31/79	12/31/78
Allegheny	63,515	50,093	340	287
Armstrong.	8,886	8,731	72	72
Beaver.	5,063	4,940	102	102
Butler	67,703	67,736**	1,201	1,210
Clarion	25,705	25,574	520	495
Clinton	0	52	0	1
Crawford	67,066	59,125	75	71
Elk	15,884	19,134	230	197
Erie	3,373	1,131	29	14
Fayette	0	0	1	1
Forest	114,220	109,771	975	1,187
Greene.	26,787	24,113	290	301
Indiana	2,037	521	14	2
Jefferson.	5,130	3,191	29	29
Lawrence.	37	0	1	0
McKean.	942,031	1,065,339	12,247	12,442
Mercer.	994	994	47	86
Potter	13,334	14,461	80	80
Venango	590,124	550,197	6,845	6,879
Warren	564,028	473,421	4,213	3,757
Washington.	128,123	85,963	607	555
Westmoreland.	365	0	7	0
Total	2,644,405	2,564,487**	27,925	27,768

* Compiled by the Pennsylvania Department of Commerce, Bureau of Statistics

** Revised figures

Figure 3. Oil reserves in Pennsylvania, 1979

	1979	1978	% Change
	(1,000 barrels)		
Total oil	50,845	48,156	+ 6
Natural gas liquids	266	323	-18

wells in Forest County, 2 wells in Potter County, and 2 wells in Elk County. This is a large increase in oil-related service wells during the year.

Figure 4 shows how much of Pennsylvania's previous production was due to secondary recovery and that the Bradford field in McKean County accounted for the majority. In 1979, 47 new water-injection wells were drilled in the Bradford field, and waterflood production in the field was 56 percent of the total statewide production.

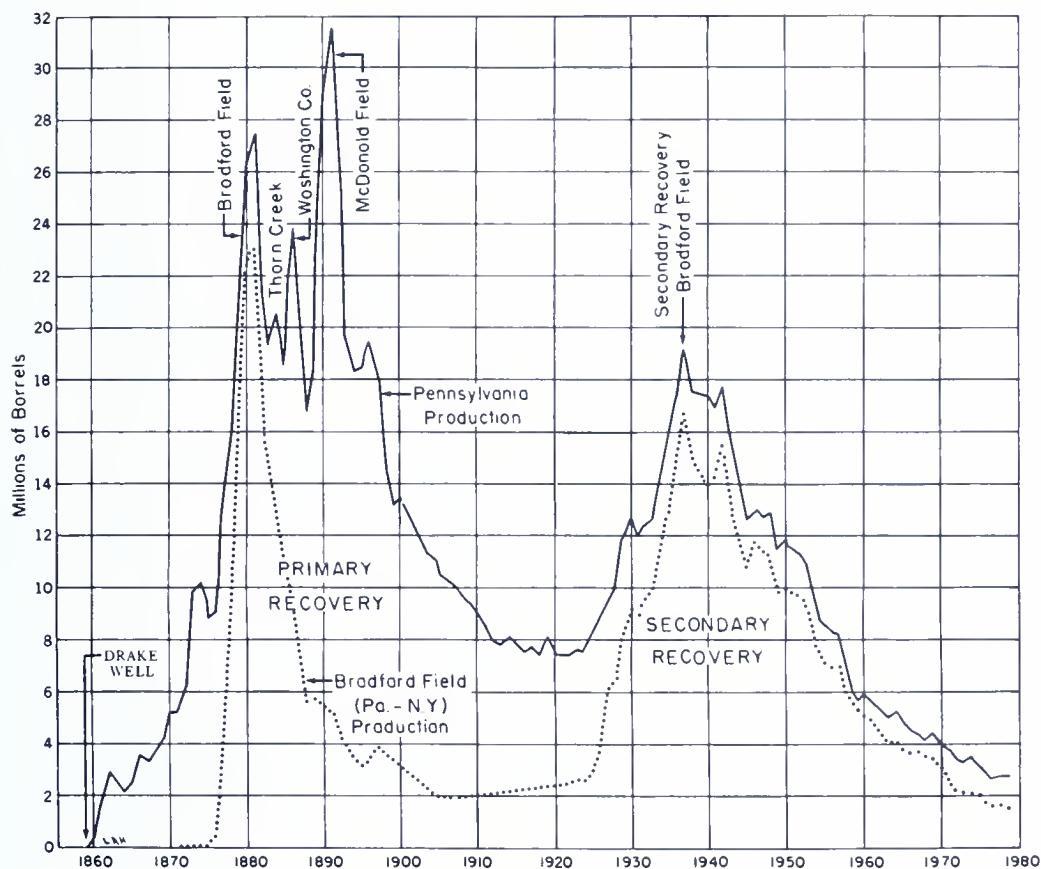


Figure 4. Annual production of crude oil in Pennsylvania

Two new waterflood projects were undertaken in 1979. The Highland Warrant waterflood project operated by Pennzoil is located in the Sackett field, Elk County. The reservoir is the Kane Sand. The second project is the Tally Ho waterflood project operated by Witco. It is located in the Guffey field, McKean County, and the Bradford Third Sand is the reservoir. The most active secondary recovery project during 1979 was the Bingham Lease waterflood operated by Pennzoil in the Bradford field, McKean County. Thirty-eight water-injection wells were completed in the project during the year.

The Penn Grade Micellar Displacement Project at Derrick City, a joint effort of Pennzoil, Witco, Quaker State, and the U. S. Department of Energy for tertiary oil recovery from the Bradford field, is reported to be progressing satisfactorily. Injection of the micellar solution continued through 1979. The project consists of 24 acres, within which are 16 input and 25 producing wells on 1.5-acre spacing; the reservoir is the Bradford Third Sand. The experimental Maraflood project in the tight Bradford Sandstone in the Bradford field at Cyclone (Project #7), jointly sponsored by Pennzoil and Witco, is in a late stage, and water injection is continuing.

A third tertiary recovery project was reported begun adjacent to Project # in late 1979. This project is also in the Bradford Sandstone in the Bradford field.

GAS PRODUCTION

Gas production in 1979 decreased 1.5 percent from 1978, totaling 96,313 million cubic feet as compared to 97,763 million cubic feet in 1978. The number of producing gas wells increased to approximately 19,800 at the end of 1979 from approximately 18,900 producing wells at the end of 1978. Figure 5 gives an overview of gas production for 1979, compared to 1978.

Figure 5. Gas production in Pennsylvania, 1979

	1979	1978	% Change	Cumulative to 12/31/79
(millions of cubic feet)				
Shallow gas ¹	83,787	84,485	-1	—
Deep gas ²	12,526	13,278	-6	—
Total gas	96,313	97,763	-1	9,299,929

¹ Shallow gas: from Late Devonian or younger rocks; generally less than 4,000 feet deep.

² Deep gas: from Middle Devonian or older rocks; generally more than 4,000 feet deep.

GAS RESERVES

The total proved recoverable reserve of natural gas rose 7.5 percent over 1978, and stored recoverable gas rose 9 percent (Figure 6). Figure 7 is a graph showing production, consumption, and reserves of natural gas in Pennsylvania.

Figure 6. Gas reserves in Pennsylvania, 1979

	1979	1978	% Change
(millions of cubic feet)			
Total gas	2,251,312*	2,093,516*	+8
Stored recoverable gas	633,494	582,260	+9

* Includes stored recoverable gas

GAS STORAGE FIELDS

Gas storage fields have been created throughout Pennsylvania to accumulate gas during low-demand periods for use during high-demand periods.

Storage capacity at the end of 1979 was 757,610,049 thousand cubic feet an increase of 115,610,408 thousand cubic feet from 1978. Recoverable gas

PRODUCTION AND RESERVES

7

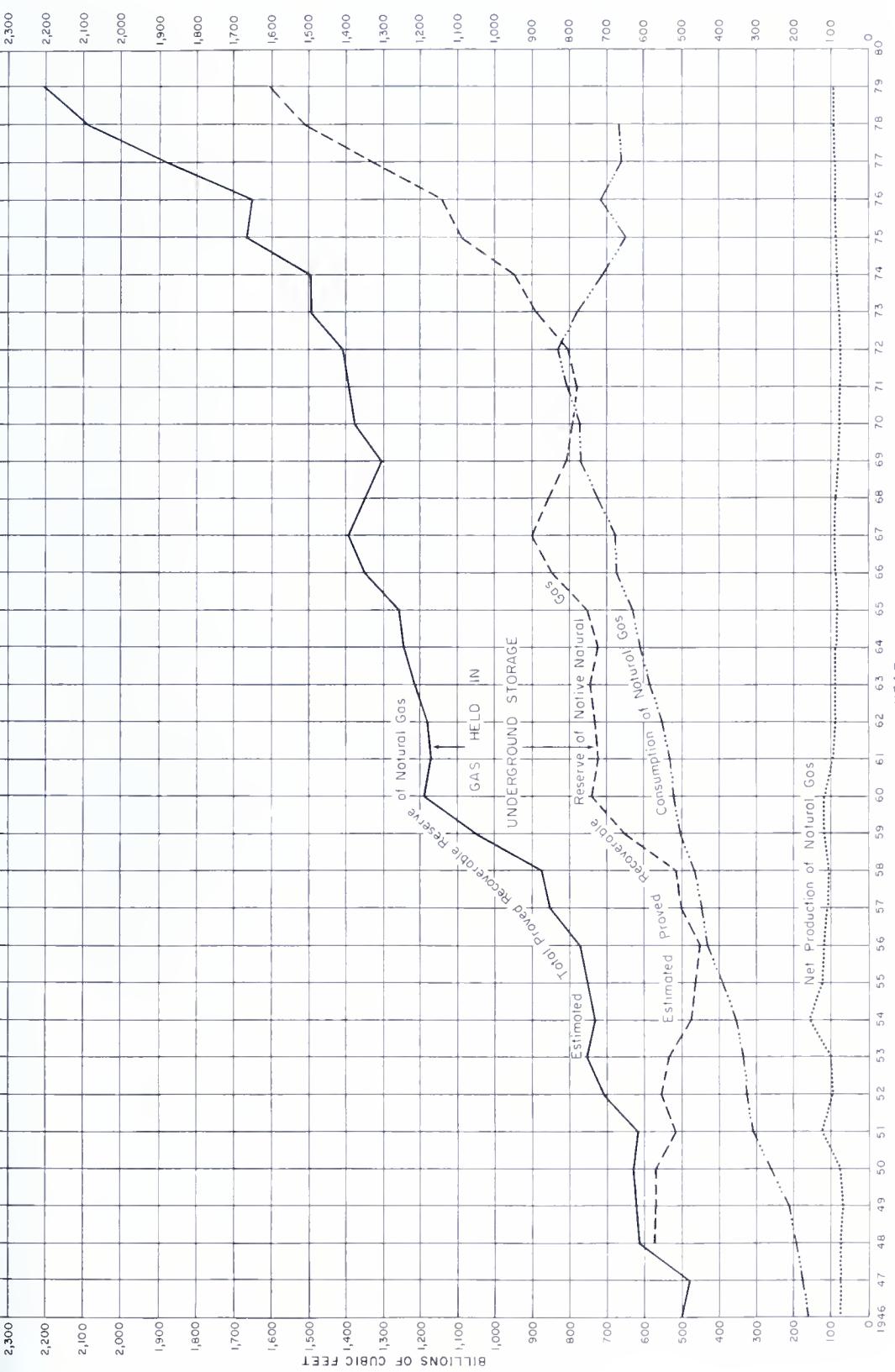
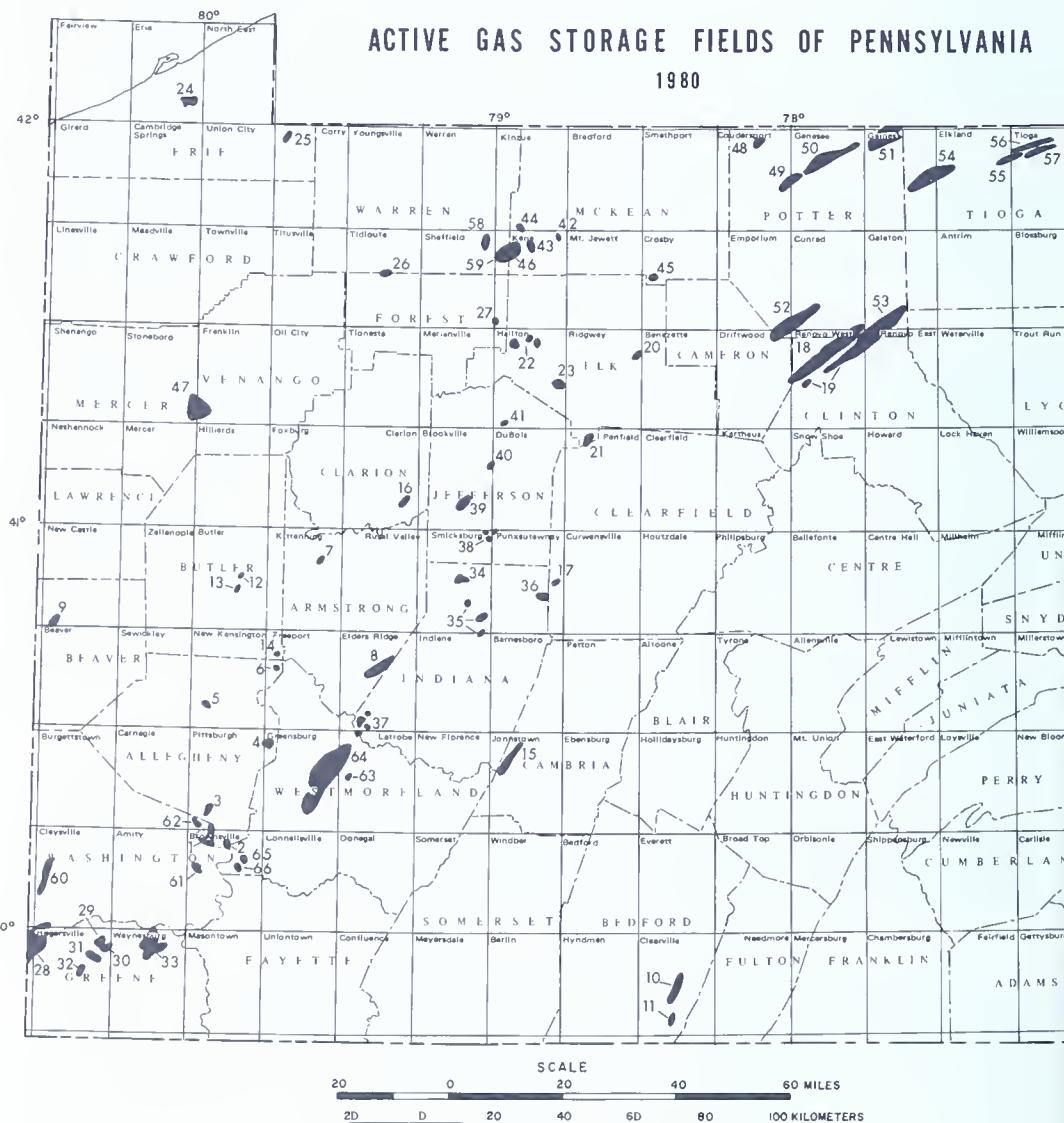


Figure 7. Production, consumption, and reserves of natural gas in Pennsylvania

in storage in 1979 was 633,494,000 thousand cubic feet compared to 582,260,406 thousand cubic feet in 1978. Figure 8 is a map showing the locations and names of all active gas storage fields in Pennsylvania.



NAME OF ACTIVE GAS STORAGE FIELDS IN PENNSYLVANIA (Continued)

CAMBRIA COUNTY	GREENE COUNTY (cont.)	POTTER COUNTY (cont.)
15. Rager Mountain	31. Hunters Cave	49. Hebron
CLARION COUNTY	32. Holbrook	50. Ellisburg
16. Truittsburg	33. Pratt	51. Harrison
CLEARFIELD COUNTY	INDIANA COUNTY	52. Wharton
17. Gourley-Miller	34. Alabran	53. Greenlick
CLINTON COUNTY	35. Kinter	TIOGA COUNTY
18. Leidy	36. Clark	54. Sabinsville
19. Tamarack-Downs	37. Schmidt	55. West End Tioga
ELK COUNTY	JEFFERSON COUNTY	56. Tioga
20. St. Marys	38. Sprankle	57. Meeker
21. Boone Mountain	39. Galbraith	WARREN COUNTY
22. Owls Nest	40. Markle	58. Deerlick
23. Belmouth	41. Munderf	59. East Branch "A"
ERIE COUNTY	McKEAN COUNTY	WASHINGTON COUNTY
24. Meade	42. Meade Run	60. Donegal
25. Corry	43. Keelor	61. Colvin
FOREST COUNTY	44. Swede Hill	62. Finleyville
26. Queen	45. Wellendorf	WESTMORELAND COUNTY
27. Duhring	46. East Branch "B"	63. Seanor
GREENE COUNTY	MERCER COUNTY	64. Oxford
28. Majorsville-Heard	47. Henderson	65. Webster
29. Swarts West	POTTER COUNTY	66. Patton
30. Swarts	48. Sharon	

OIL AND GAS PRICES

Practically all oil production in Pennsylvania is classified as stripper production (less than 10 barrels per well per day). The stripper price for Penn Grade was \$14.77 per barrel on January 1, 1979, and rose 157 percent to \$38.00 per barrel by year's end (Figure 9).

All natural gas prices in 1979 were subject to the Natural Gas Policy Act (N.G.P.A.), which was signed by President Carter on November 9, 1978. It

Figure 9. Stripper oil prices in Pennsylvania, 1979

Month	Price per barrel
January 1, 1979	\$14.77
May 1, 1979	15.50
June 13, 1979	23.00
July 26, 1979	25.00
August 1, 1979	28.50
October 1, 1979	32.50
November 1, 1979	35.00
December 1, 1979	37.00
December 31, 1979	38.00

is a comprehensive revision of the national policy concerning natural gas pricing and regulation. The Act is a gradual move toward price deregulation of newly discovered natural gas by 1985 with specific price increases for all categories of natural gas in the interim. Further, intrastate gas is put under federal price controls for the first time.

The N.G.P.A. divides gas-pricing categories into two broad groupings (1) gas under interstate contracts when the act was passed, and (2) gas not under contract at that time (Figure 10).

Pricing of gas under interstate contracts when the N.G.P.A. was passed remains set at the "just and reasonable" rates established by the Federal Energy Regulatory Commission or its predecessor, the Federal Power Commission.

Producers can collect prices up to ceilings set by the N.G.P.A. for gas not under interstate contract when the Act was passed. These prices are maximum prices and a lower price is allowable depending upon the supply-and-demand situation. Producers are required to apply to state agencies for determinations that gas qualifies for pricing under one of four categories. In Pennsylvania, this agency is the Division of Oil and Gas Regulation (N.G.P.A. Section) of the Bureau of Topographic and Geologic Survey in the Department of Environmental Resources. State agency determinations are subject to review by the Federal Energy Regulatory Commission. Applications for pricing determinations must be made on a well-by-well basis and the burden of proof for eligibility of price lies upon the producer.

The actual wellhead price paid per thousand cubic feet for natural gas during the year ranged from \$0.30 in old contracts to as high as \$2.60 per thousand cubic feet for stripper gas. The maximum price paid for new gas was \$2.17.

DRILLING AND COMPLETIONS COSTS

The costs of drilling and completing wells are conventionally given in dollars per foot. These costs vary with depth of drilling and method of completion. The costs generally increase very rapidly as wells penetrate below the usual drilling depths in a given area. A dry hole will normally be far cheaper than a completed producing well of the same depth because there are no completion costs. An "ultra deep" exploratory well will commonly be extremely expensive in terms of costs per foot due to provisions for problems not usually encountered in shallower holes or in areas of well-understood subsurface geology. In Pennsylvania, where shallow drilling is the rule (average depth per well in 1979 was 2,490 feet), a well below 5,000 feet is considered moderately deep, and below 9,000 feet ultra deep.

Due to widely varying conditions, even in the same area, and inflationary

Figure 10. Gas price ceilings under Natural Gas Policy Act of 1979*

Subpart of part 2/1	N.G.P.A. Section	Category of gas	Maximum lawful price for deliveries made in: cost per million British Thermal Units												
			Jan. 1979	Feb. 1979	Mar. 1979	Apr. 1979	May 1979	June 1979	July 1979	Aug. 1979	Sept. 1979	Oct. 1979	Nov. 1979	Dec. 1979	Jan. 1980
B	102	New Natural Gas, Certain OCS Gas	\$2.096	\$2.116	\$2.136	\$2.156	\$2.177	\$2.198	\$2.220	\$2.244	\$2.268	\$2.292	\$2.314	\$2.336	\$2.358
C	103	New Onshore Production Wells	1.980	1.993	2.006	2.019	2.033	2.047	2.062	2.079	2.096	2.113	2.128	2.143	2.158
F	106(b) (1)(B)	Alternative Maximum Lawful Price for Certain Intrastate Rollover Gas	1.128	1.136	1.144	1.152	1.160	1.168	1.176	1.185	1.195	1.205	1.213	1.221	1.229
G	107	High Cost Gas (below 15,000 only)	2.096	2.116	2.136	2.156	2.177	2.198	2.220	2.244	2.268	2.292	2.314	2.336	2.358
H	108	Stripper Gas	2.243	2.264	2.285	2.306	2.329	2.352	2.375	2.400	2.426	2.452	2.475	2.499	2.523
I	109	Not Otherwise Covered	1.639	1.650	1.661	1.672	1.684	1.696	1.708	1.722	1.736	1.750	1.762	1.774	1.786

* Prices reflect monthly adjustments for inflation and real growth factors in categories where such adjustments apply.

increases in cost of such items as steel well casing, only very approximate cost estimates can be given.

1. Venango County, shallow oil well, about 900 feet deep. Dry hole,* about \$9 per foot. Completion, about \$25-\$27 per foot.
2. McKean County, shallow oil well, about 1,800-2,000 feet deep. Dry hole,* about \$9 per foot. Completion, about \$27 per foot.
3. Indiana County, shallow gas well, about 4,000 feet deep. Dry hole,* about \$10 per foot. Completion, about \$32-\$35 per foot.
4. Jefferson-Indiana-Clearfield Counties, deep "Oriskany" gas well, about 7,500 feet deep. Dry hole,* about \$15-\$16 per foot. Completion about \$25-\$30 per foot.
5. Somerset County, deep "Oriskany" gas well, about 9,000 feet deep. Completion, about \$39 per foot.
6. Crawford County, deep gas well producing from Lower Silurian, about 5,000 feet deep. Dry hole,* about \$13-\$14 per foot. Completion, about \$28-\$29 per foot.
7. Centre County, "ultra deep" wildcat, about 11,000 feet deep. Completion, about \$125-\$200 per foot.

* No attempt at completion.

1979 DRILLING AND COMPLETIONS

TOTAL COMPLETIONS

The total number of all wells completed in Pennsylvania in 1979 was 1,941 wells, including 31 wells drilled deeper. This is an increase of 193 wells (11 percent) over 1978. The total footage drilled was 4,832,383 feet, an increase of 250,666 feet (5 percent) over 1978. The average depth per well was 2,490 feet. The seven most active counties, in order of importance, were Indiana, Venango, Warren, Forest, McKean, Jefferson, and Erie, where approximately 80 percent of all wells were drilled (Figure 11).

OIL COMPLETIONS

The total number of oil wells completed in Pennsylvania in 1979 was 757 wells, including 1 well drilled deeper. This is an increase of 200 wells (36 percent) over 1978. The total footage drilled was 801,827 feet, an increase of 222,047 feet (38 percent) over 1978. The average depth per well was 1,059 feet. The four most active counties, in order of importance, were Venango, Warren, Forest, and McKean, where approximately 99 percent of all oil wells were drilled (Figure 12).

Figure 11. New well completions and old wells
drilled deeper in Pennsylvania, 1979

NEW WELL COMPLETIONS

County	No. of wells	Average total depth (feet)
Allegheny	3	3,352
Armstrong.	84	3,530
Bedford.	3	6,788
Butler	1	2,754
Cambria	6	3,747
Clarion	18	2,262
Clearfield.	55	3,588
Crawford.	18	4,041
Elk.	4	2,532
Erie	136	3,342
Fayette.	7	4,153
Forest	171	1,081
Greene.	2	2,384
Indiana	404	3,727
Jefferson.	143	3,402
McKean.	169	1,908
Mercer.	6	2,231
Potter	6	2,324
Somerset	8	8,886
Tioga.	1	5,138
Venango	312	853
Warren	200	1,045
Washington.	26	3,343
Westmoreland.	127	3,820
Total	1,910	2,519

OLD WELLS DRILLED DEEPER

County	No. of wells	Average amt. deepened (feet)
Armstrong.	1	1,537
Butler	1	907
Clarion	1	334
Clearfield.	1	7
Elk.	1	376
Indiana	19	552
Jefferson.	2	83
McKean.	1	476
Washington.	1	1,865
Westmoreland.	3	1,497
Total	31	666

Figure 12. New oil well completions and old wells drilled deeper in Pennsylvania, 1979

NEW OIL WELL COMPLETIONS

County	No. of wells	Average initial production (bopd)*	Average total depth (feet)
Clarion.....	2	1	1,063
Crawford.....	1	4	606
Forest.....	144	12	1,042
McKean.....	103	4	1,860
Potter.....	1	not given	1,440
Venango.....	307	16	816
Warren.....	196	19	1,021
Washington.....	2	337	2,348
Total.....	756	15	1,060

OLD OIL WELL DRILLED DEEPER

County	No. of wells	Average initial production (bopd)*	Average amount deepened (feet)
McKean.....	1	3	476

* bopd = barrels of oil per day

GAS COMPLETIONS

The total number of gas wells completed in Pennsylvania in 1979 was 1,043 wells, including 29 wells drilled deeper. This is a decrease of 62 wells (6 percent) over 1978. The total footage drilled was 3,687,025 feet, a decrease of 107,486 feet (3 percent) over 1978. The average depth per gas well was 3,535 feet. The five most active counties, in order of importance, were Indiana, Jefferson, Erie, Westmoreland, and Armstrong, where approximately 86 percent of all gas wells were drilled (Figure 13).

Figure 13. New gas well completions and old wells drilled deeper in Pennsylvania, 1979

NEW GAS WELL COMPLETIONS

County	No. of wells	Average open flow (Mcfgpd)*	Average total depth (feet)
Allegheny.....	3	78	3,352
Armstrong.....	83	411	3,530
Butler.....	1	20	2,754

Figure 13. (Continued)
NEW GAS WELL COMPLETIONS

County	No. of wells	Average initial open flow (Mcfgpd)*	Average total depth (feet)
Cambria.....	6	313	3,747
Clarion.....	15	157	2,085
Clearfield.....	52	639	3,553
Crawford.....	15	2,161	4,742
Erie.....	130	1,173	3,358
Fayette.....	6	162	4,168
Forest.....	4	91	1,701
Indiana.....	400	790	3,742
Jefferson.....	139	525	3,411
McKean.....	5	136	1,656
Mercer.....	5	664	2,603
Potter.....	2	13	1,523
Somerset.....	6	1,742	8,985
Venango.....	2	48	3,808
Warren.....	1	1,100	4,620
Washington.....	23	207	3,453
Westmoreland.....	116	694	3,820
Total.....	1,014	738	3,617

OLD GAS WELLS DRILLED DEEPER

County	No. of wells	Average initial open flow (Mcfgpd)*	Average amount deepened (feet)
Armstrong.....	1	683	1,537
Clarion.....	1	1	334
Clearfield.....	1	134	7
Elk.....	1	5	376
Indiana.....	19	1,179	552
Jefferson.....	2	193	83
Washington.....	1	93	1,865
Westmoreland.....	3	958	1,497
Total.....	29	916	664

* Mcfgpd = thousand cubic feet of gas per day

**COMBINATION OIL AND GAS WELL COMPLETIONS
 (not reported separately as oil or gas)**

This classification refers to those wells that are primarily oil wells but that also produce 100 thousand or more cubic feet of gas per day. Because most oil wells completed in Pennsylvania are drilled in partially depleted reser-

voirs, most produce only very small amounts of gas with the oil. Therefore, this category includes only a small number of wells. In 1979, 6 oil-and-gas wells were completed, whereas in 1978, 15 such wells were completed (Figure 14).

Figure 14. New combination oil and gas well completions in Pennsylvania, 1979

County	No. of wells	Average initial open flow (Mcfgpd)*	Average initial production (bopd)**	Average total depth (feet)
Erie	1	800	4	2,655
Forest.....	1	100	3	1,800
Warren.....	3	108	9	1,416
Westmoreland	1	473	1	4,291
Total	6	283	6	2,166

* Mcfgpd = thousand cubic feet of gas per day

** bopd = barrels of oil per day

DRY COMPLETIONS

The total number of dry holes drilled in Pennsylvania in 1979 was 51, including 1 old well drilled deeper and completed dry. This compares to 50 dry-hole completions in 1978, including 1 old well drilled deeper and completed dry. The comparative footages are 179,858 in 1979 and 148,760 in 1978. Figure 15 shows the number of dry holes drilled and deepened in 1979.

MISCELLANEOUS COMPLETIONS

Comprised under this heading are stratigraphic or core tests, which are holes drilled basically for subsurface information; water-input wells for secondary recovery by waterflood operations; air- or gas-injection wells for secondary oil recovery by air or gas drive; water-supply wells for waterfloods; liquid-waste-disposal wells; and gas-storage observation wells. Fluctuations in this category are usually not significant as an indicator of general activity. However, in 1979, 84 miscellaneous wells were completed, compared to 21 in 1978 and only 8 in 1977. This total included 1 gas-storage observation well and 83 water- or air-injection wells for secondary oil recovery operations. This is a large increase in oil-related service wells during the year (Figure 16).

Figure 15. New dry-hole completions and old wells drilled deeper but completed dry in Pennsylvania, 1979

NEW DRY-HOLE COMPLETIONS

<i>County</i>	<i>No. of dry holes</i>	<i>Average total depth (feet)</i>
Armstrong.....	1	3,550
Bedford.....	3	6,788
Clarion.....	1	7,316
Clearfield.....	3	4,188
Crawford.....	2	502
Elk.....	2	2,724
Erie.....	5	3,067
Fayette.....	1	4,060
Forest.....	2	4,323
Greene.....	2	2,384
Indiana.....	4	2,220
Jefferson.....	4	3,074
McKean.....	2	1,755
Mercer.....	1	373
Somerset.....	2	8,586
Tioga.....	1	5,138
Venango.....	3	2,633
Washington.....	1	2,802
Westmoreland.....	10	3,783
Total	50	3,579

OLD WELL DRILLED DEEPER, COMPLETED DRY

<i>County</i>	<i>No. of wells</i>	<i>Average amt. deepened (feet)</i>
Butler	1	907

Figure 16. Service well completions in Pennsylvania, 1979

<i>County</i>	<i>No. of wells</i>	<i>Average total depth (feet)</i>
Elk.....	2	2,341
Forest	20	875
McKean.....	59	2,018
Potter	3	3,153
Total	84	1,794

DRILLING AND PRODUCTION ACTIVITY

(classified as shallow or deep)

Drilling and production in Pennsylvania is classified by the Pennsylvania Geological Survey as follows: (1) shallow, based on reservoirs in rock formations of Pennsylvanian, Mississippian, and Late Devonian age, generally less than 4,000 feet deep, and (2) deep reservoirs, which are in rock formations of Middle Devonian or older age, generally over 4,000 feet deep.

The shallow reservoirs generally produce both oil and gas; the deep almost entirely gas. Figure 17 is a graph showing the shallow-well activity from 1950-1979.

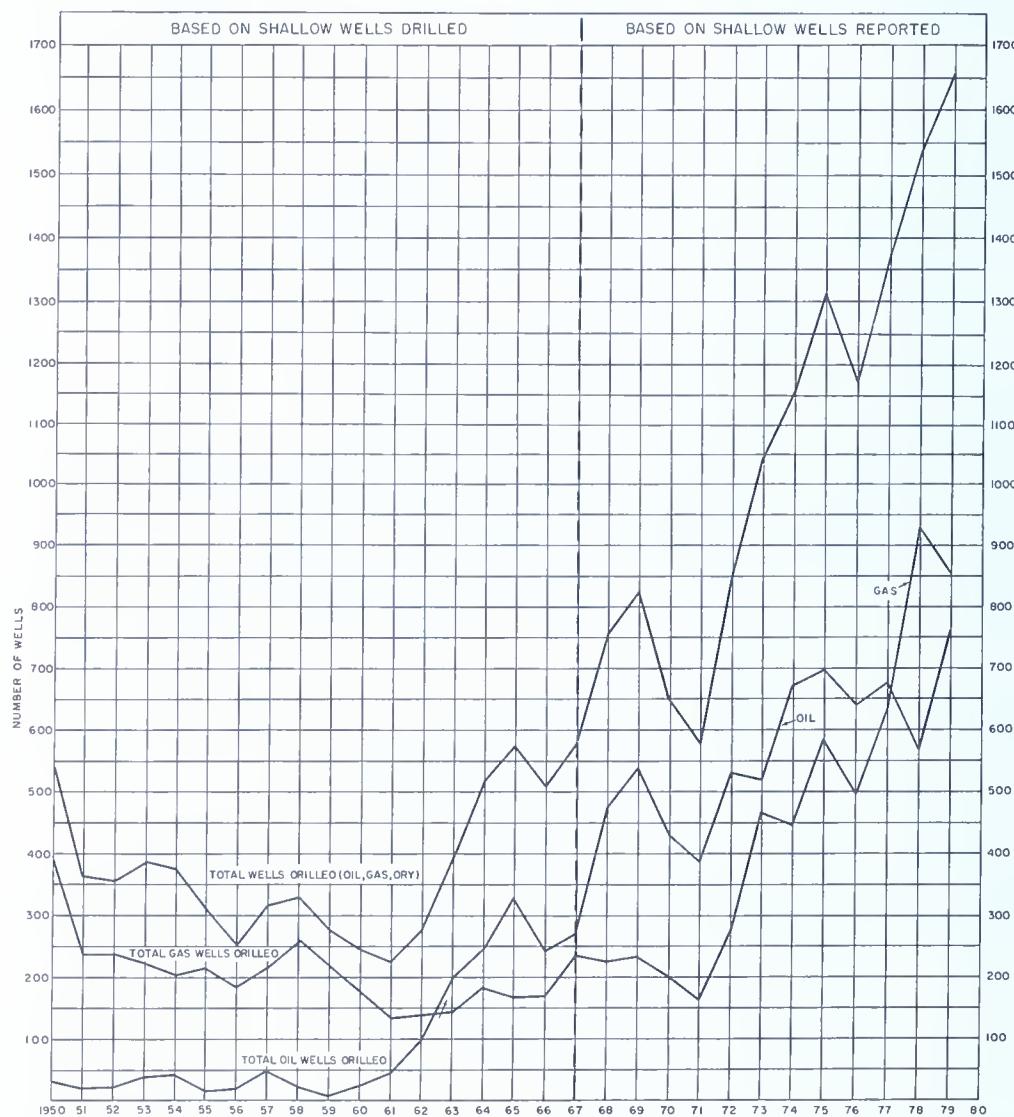


Figure 17. Shallow well activity, 1950-1979 (Late Devonian or younger producing horizons; generally less than 4,000 feet)

The Medina (Lower Silurian) sandstones of Erie and Crawford Counties are usually less than 4,000 feet deep. They produce a small amount of oil with the gas and are regarded as deep horizons due to their geologic age. This exception is restricted to the northwest corner of the Commonwealth.

Deep drilling was up from 148 wells in 1978 to 175 wells in 1979. Erie County, where 134 such wells were drilled, was the most active deep-drilling area; 128 were gas wells, 1 was a combination oil and gas well, and 5 were dry. Figure 18 is a graph showing the annual rate of deep exploration and development from 1930 through 1979.

The Amoco #1 Svetz, drilled in Somerset County in 1974 to 21,460 feet, is still the deepest penetration in the Appalachian Basin. Figure 19 shows 1979 completions divided into wells in Late Devonian and younger formations and wells in Middle Devonian and older formations.

A total of 12,526 million cubic feet of gas and 70,440 barrels of oil were produced from deep reservoirs in 1979. A summary by field and pool of deep gas production in 1979 and the cumulative production from these reservoirs is given in Figure 20. The producing-depth record still stands at 11,458 feet from the Tuscarora (Lower Silurian) sandstone in Summit field, Fayette County.

OTHER ACTIVITIES RELATED TO OIL AND GAS DEVELOPMENTS

GEOPHYSICAL ACTIVITY

The principal nondrilling exploratory tool used in Pennsylvania is the exploration seismograph, which can give approximate to excellent indications of the attitude of the rocks at depth by measuring the time of travel of vibrations to and from the surface. The principal technique now in use in Pennsylvania is Vibroseis, wherein seismic pulses are generated at the surface by mechanical means, rather than by using explosives in very shallow drill holes. The work is usually done by contract crews, and the intensity of activity is gauged by the number of crew-months of operations. Seismic exploration was down slightly from 30.95 crew-months in 1978 to 29.78 crew-months in 1979. Seismic surveys were reported in Bedford, Cambria, Centre, Columbia, Fayette, Fulton, Luzerne, Lycoming, Mercer, McKean, Montour, Northumberland, Snyder, Somerset, Tioga, Warren, Westmoreland, Union, and Venango Counties. Seven seismic-survey permits were issued by the Department of Environmental Resources for evaluation of State Forest lands in the Forbes, Gallitzin, Moshannon, Tiadaghton, and Tioga State Forests in Bedford, Centre, Lycoming, Somerset, Tioga, Union, and Westmoreland Counties.

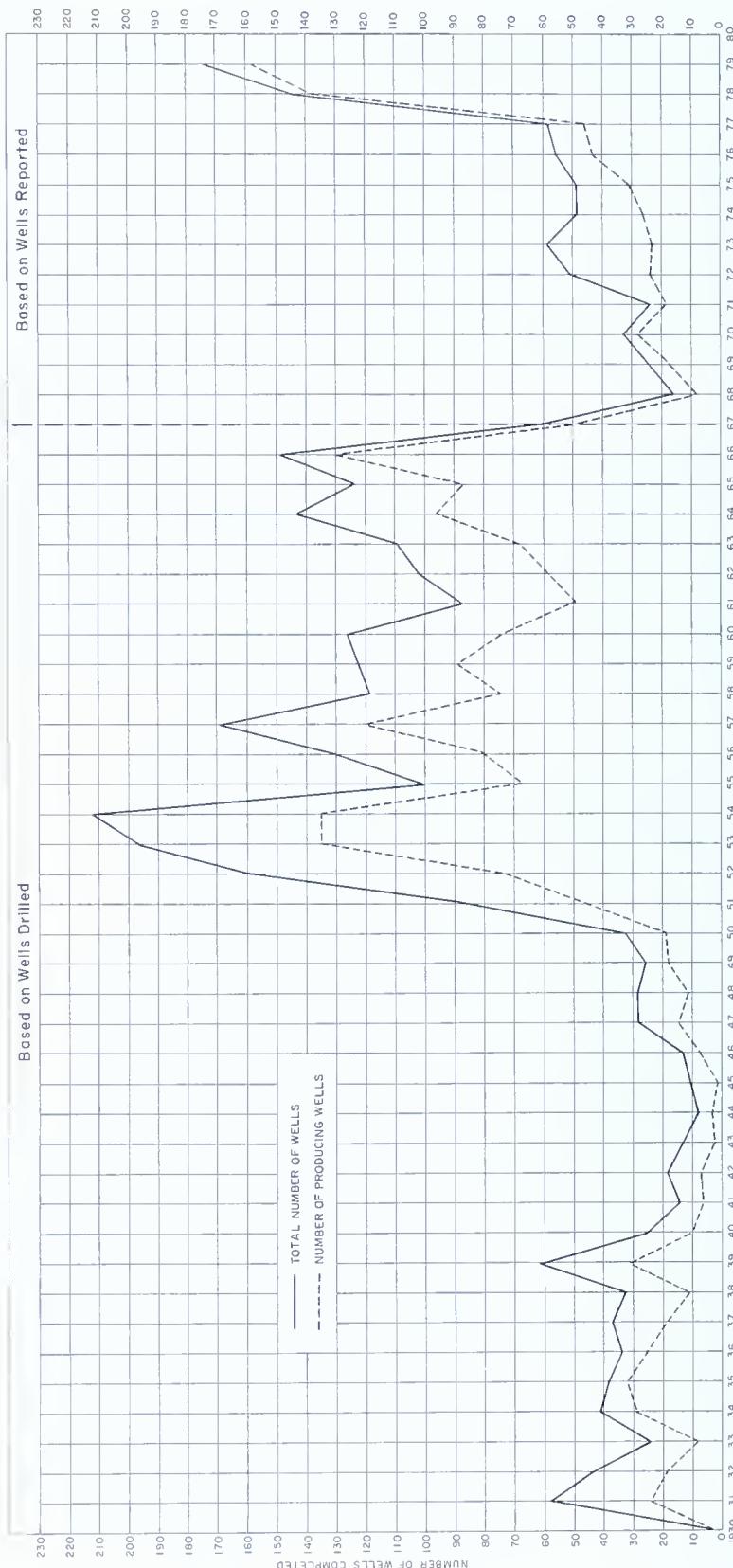


Figure 18. Annual rate of deep sand exploration and development, 1930-1979 (Middle Devonian or older producing horizons; generally more than 4,000 feet)

Figure 19. Drilling and completion of wells reported, 1979
 (according to geologic age and depth of
 producing horizons)

<i>Shallow — Late Devonian and younger</i>	
NEW WELLS	
Gas	857
Oil	756
Oil and gas	5
Dry	34
<i>Total</i>	1,652
DEEPPENED WELLS	
Gas	29
Oil	1
Dry	1
<i>Total</i>	31
MISCELLANEOUS WELLS	
Service	83
<i>Deep — Middle Devonian and older</i>	
NEW WELLS	
Gas	157
Oil and gas	1
Dry	16
<i>Total</i>	174
MISCELLANEOUS WELL	
Service	1
<i>TOTAL ALL WELLS DRILLED</i>	1,941

ACTIVITIES ON STATE LANDS

At the end of 1979, there were 48 active oil and/or gas leases on Pennsylvania Game Commission lands, totaling 69,227 acres. This compares to 47 active leases in 1978 totaling 63,755 acres. During the year, no additional acres of Game Commission lands were put under lease. There were 37 producing gas wells on 12 of the leases. The total production for 1979 from these wells was 377,687 thousand cubic feet of gas. One lease produced 22.91 barrels of oil.

In 1979, income from oil and gas activities on State Forest lands totaled \$1,332,244. These monies were obtained from production royalties, gas storage and exploration acreage rentals, pipeline rights-of-way, and seismic permits. Of this total, royalty payments for the year amounted to \$41,100 for 381,405 thousand cubic feet of gas. Rentals for existing wildcat (exploratory) acreage and past leasing programs totaled \$670,733, and storage rentals were \$607,064. Other income for pipeline rights-of-way, compressor station (location) rentals, and seismic surveys totaled \$13,347.

Figure 20. Gas production from rocks of Middle Devonian or older age in Pennsylvania, 1979
(classified as "deep" production)

OTHER ACTIVITIES

Figure 20. (Continued)

County	Field	Pool	Cumulative production at		Cumulative production at end of 1979 (in Mcf*)	Status of field or pool at end of 1979
			Discovery date	end of 1978 (in Mcf*)		
Fayette	Feik	Woodside	8/ 8/63	561	7,135	7,696
	Highhouse		3/10/75			Producing
	Mill Run		8/17/78			Shut-in
Ohioopyle	Rugg		12/28/59	4,386,722	52,274	4,438,996
Sandy Creek	Quebec Run		6/ 3/69	10,743	5,774	16,517
Spruell			10/13/61	6,285,801	530,288	6,816,089
Summit	East Summit		12/30/60	27,150	0	27,150
	North Summit		3/24/38	21,529,045	57,514	21,586,559
	South Summit		5/ 9/42	22,396,544	120,128	22,516,672
	Crichton		1/ 9/63	3,013,170	52,116	3,077,286
	Hadden		7/11/63		12,000	Producing and abandoned
	Tannery		9/21/56	29,604,391	221,303	29,825,694
Nolo			9/30/56	13,792,139	54,644	13,846,783
Strongstown	Lizowitz		6/19/54	8,293,856	279,844	8,573,700
	Pineton		12/20/69	8,496,055	161,703	8,657,758
	Elk Run		6/30/65	47,893,900	282,908	48,176,808
	Cyclone		6/24/76	9,147	19,992	29,139
Jefferson	Frostburg		2/18/74	806,241	159,558	965,799
Lycoming	Salladasburg		1/10/75	10,000	1,500	11,500
McKean	Bradford		9/ 8/72	0	16,887	16,887
Mercer	Corydon		10/26/66	not available	352,122	Producing
	Henderson		11/11/76			Shut-in
	Maysville		2/26/77			Shut-in
	Sharon		7/24/63	256,974	14,022	270,996
	Wheatland		10/ 2/39	4,251,928	21,469	4,327,605
Potter	Ulysses		4/ 2/62		54,208	Producing
	<i>TOTAL</i>					
	Newfield					

OTHER ACTIVITIES

25

Boswell	Edie	11/11/58	10,922,016**	147,950	11,069,966	Producing
	Snyder	10/18/68	15,734	8,462	24,196	Producing
		6/16/60	1,042,756**	23,808	1,066,564	Producing
		8/16/77				Shut-in
Heckman Hollow		5/28/79				Shut-in
Rockwood		10/ 3/77				Shut-in
Shade Creek		5/10/79	0	68,414	68,414	Producing
Shamrock		9/22/73	874,183	2,319,735	3,193,918	Producing
Shanksville		1/ 6/78	22,945	536,323	559,268	Producing
Somerset West	Duncan	4/ 5/73	107,206	5,116	112,322	Producing
Venango	Barkleyville					
Franklin-Oak						
Forest	Galloway	11/12/73	47,571	6,275	53,846	Producing
Wesley	Irwin	12/ 1/72	240,963	32,916	273,879	Producing
Warren	Stillwater	9/26/79				Shut-in
Sugar Grove	Pettigrew	5/29/70				Shut-in
Washington	Whites Run	10/30/75				Shut-in
Westmoreland	Glyde	9/ 6/61	131,443	437	131,880	Producing
	Kahl	10/23/62	10,619,139	212,460	10,831,599	Producing
	Bailey	12/26/61	2,008,147	86,119	2,094,266	Producing
	Dry Ridge	8/25/46	5,782,040	86,572	5,868,612	Producing
	<i>TOTAL</i>	8/17/49	6,587,632	41,115	6,628,747	<i>Producing and abandoned</i>
St. Boniface						
Chapel		9/13/56	5,848,204	41,115	5,889,319	Producing
<i>TOTAL</i>		10/22/63	729,997	17,793	747,790	<i>Producing and abandoned</i>
Murrysville	Duquesne	8/ 8/65	601,880	17,793	619,673	Producing
Westmoreland and						
Somerset	Johnstown					
Baldwin		5/22/60	10,817,276	19,722	11,140,492	Producing and abandoned
Beck		5/16/57		303,494		
Williams		2/14/58	18,361,963	226,878	18,588,841	Producing
<i>TOTAL</i>		12/ 5/58	7,705,561	97,973	7,803,534	<i>Producing and abandoned</i>
Blair		12/ 5/58		55,935		
Tunnel		3/10/65	6,284,655	22,110	6,362,700	Producing
Seven Springs		8/ 3/66	708,483	19,928	728,411	Producing

*Mcf = thousand cubic feet

**Correction

During the year, 21,950 acres of additional State Forest lands was leased for exploratory and development drilling in Centre, Clinton, Lycoming, and Somerset Counties. The bonus bid for the acreage averaged \$20.96 per acre, for a total of \$460,072. In October, 287 acres of the Moshannon State Forest was placed under lease to be included in the Boone Mountain gas storage field.

At the end of the year, 272,174 acres of State Forest and Park lands was currently under lease for oil and gas exploration and development. This includes 100,493 acres in gas storage areas.

1979 OIL AND GAS EXPLORATORY AND DEVELOPMENT HIGHLIGHTS

These classifications apply to the same wells reported under drilling and completions.

EXPLORATORY WELLS

An exploratory well is a well drilled to (1) find and produce oil or gas in an unproved area; (2) find a new reservoir in a field previously found to be productive of oil or gas in another reservoir; or (3) extend the limits of a known oil or gas reservoir. Exploratory wells include the following: new field wildcat, new pool wildcat, deeper pool test, shallower pool test, or outpost extension test. If the well is not completed for production, it is an exploratory dry hole. Exploratory drilling in 1979 (69 wells) was down 29 percent from 1978 (97 wells), and the success ratio was 78 percent (see Figure 21 for locations of all exploratory wells drilled in 1979).

DEVELOPMENT WELLS

In general, a development well is a well drilled within the proved area of an oil or gas reservoir to the depth of a stratigraphic horizon known to be productive. If the well is completed for production, it is classified as an oil or gas development well. If the well is not completed for production, it is classified as a dry development hole. Development drilling in 1979 was up 10 percent from 1978, and had a 98 percent success ratio.

Figure 22 shows both exploratory and development drilling for 1979 by type of well (oil, gas, etc.) and gives total footage. Figure 23 shows exploratory drilling in Pennsylvania by exploratory classification and type of well.

Explanations for exploratory and development wells are modified from definitions used by the Committee on Statistics of Drilling of the American Petroleum Institute/American Association of Petroleum Geologists.

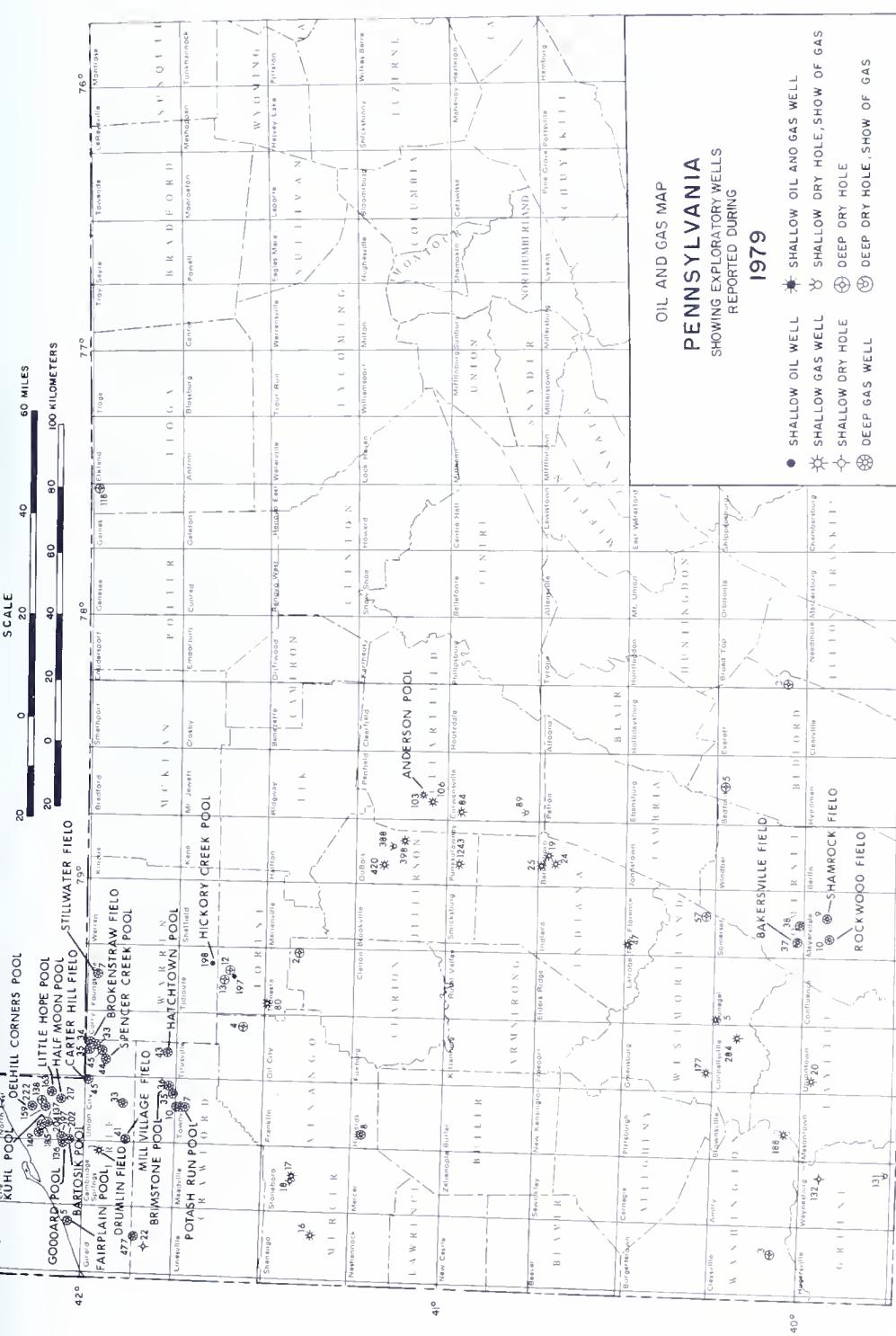


Figure 21. Map of exploratory wells in Pennsylvania reported in 1979

Figure 22. Exploratory and primary development and drilling footages reported, 1979 and 1978

Type of well	1979 Wells	1979 Footage	1978 Wells	1978 Footage	% Change in footage
Exploratory					
Gas.....	52	220,273	70	282,452	
Oil	2	3,286	4	8,933	
Oil and gas	0	0	2	5,698	
Dry.....	15	62,851	21	81,403	
<i>Total (% successful)</i>	<i>69 (78%)</i>	<i>286,410</i>	<i>97 (78%)</i>	<i>378,486</i>	<i>- 24</i>
Development					
Gas.....	991	3,466,752	1,035	3,512,059	
Oil	755	798,541	553	570,847	
Oil and gas	6	12,995	13	27,293	
Dry.....	36	117,007	29	67,357	
<i>Total (% successful)</i>	<i>1,788 (98%)</i>	<i>4,395,295</i>	<i>1,630 (98%)</i>	<i>4,177,556</i>	<i>+ 5</i>
Miscellaneous wells					
Service	84	150,678	21	25,675	+ 487
<i>TOTAL ALL WELLS DRILLED</i>	<i>1,941 (97%)</i>	<i>4,832,383</i>	<i>1,748 (97%)</i>	<i>4,581,717</i>	<i>+ 5</i>

Figure 23. Exploratory drilling in Pennsylvania by classification and type of well, 1979

<i>Classification and type of well</i>	<i>No. of wells</i>	<i>Footage</i>
NEW FIELD WILDCATS		
Gas	8	45,118
Dry	6	31,957
Subtotal	14	77,075
NEW POOL WILDCATS		
Oil	1	1,570
Gas	10	40,482
Subtotal	11	42,052
SHALLOWER POOL TESTS		
Gas	2	4,990
Dry	1	934
Subtotal	3	5,924
DEEPER POOL TESTS		
Gas	2	12,676
Dry	3	17,210
Subtotal	5	29,886
OUTPOST EXTENSIONS		
Oil	1	1,716
Gas	30	117,007
Dry	5	12,750
Subtotal	36	131,473
GRAND TOTAL EXPLORATORY WELLS		
GRAND TOTAL EXPLORATORY WELLS	69	286,410

HIGHLIGHTS OF 1979 EXPLORATION

Amoco Production Company and U.G.I. Development Corporation of Valley Forge, Pennsylvania, whose gas utility division services customers in eastern Pennsylvania, began an extensive exploratory drilling program in Pennsylvania in 1977. During 1977, four new fields were discovered, three in Somerset County and one in Centre County. In 1978, one field was completed in Fayette County. This deep drilling program was continued in 1979, and a total of seven wells were completed during the year, five producers and two dry holes. This 1979 drilling program has been centered in Somerset and Centre Counties, and a significant deep test was made in Northumberland County.

In Somerset County, three new fields were discovered in 1979, the Bakersville field, the Shamrock field, and the Rockwood field. Each field produces from the Oriskany sandstone at depths ranging from 8,777 feet to 9,050 feet. The initial potential of the wells ranged from 1,550 Mcfgpd to 2,500 Mcfgpd.

In Centre County, drilling continued in the vicinity of the Devils Elbow field, discovered in 1977 by the Amoco and U.G.I. #1 Texasgulf well, which has remained an incomplete tight hole through 1979. This well is reported to have had an initial potential of 37,000 Mcfgpd natural open flow from the Lower Silurian Tuscarora sandstone. The total depth of the well is 11,187 feet. An offset development well, #2 Texasgulf, was drilled in 1978 to a total depth of 13,052 feet and plugged as a dry hole. A second development well, #1 C & K Coal, was also drilled in 1978 and remains a tight hole. It is reported to have been completed at a total depth of 11,170 feet and to be producing an unknown quantity of gas from the Tuscarora. In 1979, Amoco drilled the #2 Griffith well to a total depth of 6,884 feet, at which point mechanical problems were encountered and the hole was junked. The rig was skidded approximately 50 feet and is drilling to a permitted depth of 9,000 feet. The well is an extension of the Devils Elbow field.

In Northumberland County, Amoco is drilling a significant deep wildcat, #2 Wilhour, permitted to 14,000 feet. This well is located in the Valley and Ridge province of the Appalachian Basin and is a test of overthrust structure. The well was drilling at year's end.

Medina (Lower Silurian) sandstone gas development in northwestern Pennsylvania continued during the year at a rapid pace. A total of 128 new gas wells and one oil and gas combination well were completed in Erie County in the Medina Sandstone Group. Several new fields and pools were completed in Erie, Crawford, and Warren Counties.

Figures 21, 24, and 25 include a map showing the 1979 exploratory effort, a table showing all 1979 new field and new pool discoveries, and a table showing selected exploratory failures.

PROJECTS IN PROGRESS IN 1979, OIL AND GAS GEOLOGY DIVISION

OIL AND GAS BASE MAP PROGRAM

Thirty-two base maps showing locations of oil and gas wells and the outlines of oil, gas, and gas storage fields are available (see Figure 26 for index map of the area covered). Each base map encompasses four 15-minute topographic quadrangles at a scale of 1:62,500, or one inch equals approximately one mile. A 5-minute grid, quadrangle names, county, boundaries, and major rivers and towns make up the background of the base map. All known deep wells (wells that penetrated Middle Devonian or older rocks) and those shallow wells (wells not reaching Middle Devonian) on record with the Survey are located. Status (dry, oil, gas, etc.) of each, and elevation and total depth of many are shown. Symbols indicate whether borehole geo-

Figure 24. Reported new field and new pool discoveries in Pennsylvania, 1979

County and permit no.	Quadrangle and map no.	Operator well no. and lease	Completion date (M-Day-Y)	Total depth (feet)	Name of formation at T.D. *	Prod. depth (feet)	Prod. formation or zone *	Initial daily prod.	Field or pool name	Explor. class**
Clearfield CLE-20863	Penfield 103	Doran and Associates, Inc. #1 T. L. Borchert	6/28/79	3,375	Canadaway	2,699	Canadaway	411 Mcf	Anderson pool	NPD
Crawford CRA-20588	Corry 43	Wainoco Oil & Gas Company #1 Lee A. Hopkins	6/27/79	5,260	Queenston	5,101	Medina (S)	198 Mcf	Hatchtown pool	DPD
Crawford CRA-20567	Townville 7	Wainoco Oil & Gas Company #7 Scott L. Preston	3/18/79	4,820	Queenston	4,711	Medina (S)	540 Mcf	Potash Run pool	NPD
Crawford CRA-20561	Union City 36	Wainoco Oil & Gas Company #5 James & Helen Anderson	1/30/79	5,085	Queenston	4,955	Medina (S)	7,898 Mcf	Brimstone pool	NPD
Erie	Cambridge Springs 1	Gordon Marsh #1 Marsh	10/21/78	1,107	Dev. shale	1,107	Dev. shale (D)	30 Mcf	Drumlin field	NFD
Erie	Corry 34	Appalachian Energy, Inc. #1 Harold Raymond	7/27/78	4,260	Queenston	4,183	Medina (S)	1,100 Mcf	Brokenstraw field	NFD
Erie	Corry 44	Doran and Associates, Inc. #1 Cubbon Lumber	6/19/79	4,404	Queenston	4,334	Medina (S)	385 Mcf	Spencer Creek pool	NPD
Erie	Fairview 5	Envirogas, Inc. #1 George Mason	6/ 5/79	2,870	Queenston	2,753	Medina (S)	111 Mcf	Fairplain pool	NPD
Erie	Erie 136	Envirogas, Inc. #1 John Kochler	8/31/78	3,705	Queenston	3,612	Medina (S)	318 Mcf	Goddard pool	NPD
Erie	North East 137	Envirogas, Inc. #1 Walter Kuhl	8/14/78	3,606	Queenston	3,528	Medina (S)	259 Mcf	Kuhl pool	NPD
Erie	North East 163	Envirogas, Inc. #1 Raleigh Chesley	12/ 7/78	3,724	Queenston	3,639	Medina (S)	551 Mcf	Little Hope pool	NPD
Erie	North East 202	Envirogas, Inc. #1 James Fiske	3/ 7/79	2,580	Keyser (D-S)	2,506	Oriskany (D)	2,700 Mcf	Bartosik pool	SPD
Erie	North East 217	Hanley and Bird #1 W. Halloran	9/ 6/79	3,656	Queenston	3,626	Medina (S)	70 Mcf	Half Moon pool	NPD
Erie	North East 222	Envirogas, Inc. #2 Carl Bemis	6/23/79	2,410	Onondaga	2,410	Onondaga (D)	11,400 Mcf	Delhill Corners pool	SPD
Erie	Union City 41	N.E.A. Cross Company #1 George & Shirley McLaughlin	7/27/79	4,070	Queenston	3,918	Medina (S)	2,300 Mcf	Mill Village field	NFD
Erie	Union City 45	Envirogas, Inc. #2 Leon Morton	5/14/79	4,368	Queenston	4,285	Medina (S)	551 Mcf	Carter Hill field	NFD

Figure 24. (Continued)

County and permit no.	Quadrangle and map no.	Operator well no. and lease	Completion date (M-Day-Y)	Total depth (feet)	Name of formation at T.D.*	Prod. depth (feet)	Prod. formation or zone*	Initial daily prod.	Field or pool name	Explor. class**
Fayette FAY-20250	Uniontown 20	Peoples Natural Gas Company #1 Michael Harin	10/13/79	5,237	Canadaway (D)	5,237	Canadaway (D)	4 Mcf	Unnamed; noncommercial	NPD
Somerset SOM-20080	Meyersdale 9	Amoco Production and U.G.I. #1 John D. Weaver	5/10/79	9,050	Helderberg (D)	8,954	Oriskany (D)	2,500 Mcf	Shamrock field	NFD
Somerset SOM-20081	Meyersdale 10	Amoco Production and U.G.I. #1 Helen Wolf Gas Unit	5/28/79	8,791	Helderberg (D)	8,644	Oriskany (D)	1,550 Mcf	Rockwood field	NFD
Somerset SOM-20072	Somerset 37	Amoco Production and U.G.I. #1 Dale S. Barron	1/14/79	8,852	Oriskany (D)	8,759	Oriskany (D)	2,000 Mcf	Bakersville field	NFD
Warren WAR-26458	Tidioute 198	I. E. Kelley Lot 5221 KIN-2103	6/27/78	1,570	Canadaway (D)	608	Venango 3 (D)	10 Bbl	Hickory Creek pool	NPD
Warren WAR-27425	Youngsville 7	Red Leaf Oil, I. td. Warren E. Bartsch	9/26/79	4,620	Queenston (O)	4,510	Medina (S)	1,100 Mcf	Stillwater field	NFD

* (D) = Devonian; (S) = Silurian; (D-S) = Devonian-Silurian; (O) = Ordovician

** NFD = new field discovery; NPD = new pool discovery; DPD = deeper pool discovery; SPD = shallower pool discovery

Figure 25. Selected exploratory failures reported in Pennsylvania, 1979

County and permit no.	Quadrangle and map no.	Operator well no. and lease	Completion date (M-Day-Y)	Total depth (feet)	Name of formation at T.D.*	Explor. class**
Bedford BED-20057	Bedford 5	Adobe Oil and Gas Corp. #1 George & Sara Hamilton	7/12/78	6,585	Helderberg (D)	NFW
Bedford BED-20058	Broad Top 3	Consolidated Gas Supply #1 Jack E. Colledge	3/31/79	7,853	Gander Run Shale Member (D)	NFW
Clarion CLA-20751	Tionesta 2	Peoples Natural Gas Co. #7 North Penn Gas Company	4/17/79	7,316	Queenston (O)	DPT
Forest FOR-22185	Tidioute 12	John A. Vertullo Lot 5200, DJV-0001	9/14/78	4,401	Helderberg (D)	NFW
Forest FOR-22182	Tidioute 13	John A. Vertullo Lot 5202, DJV-0201	9/2/78	4,245	Helderberg (D)	NFW
Greene GRE-21340	Waynesburg 132	U. S. Bureau of Mines #M-1 Morgan Township	1/16/76	934	Upper Freeport coal (P)	SPT
Tioga TIO-20074	Gaines 118	Columbia Gas Transmission #1 Marion B. Payne	10/15/77	5,138	Helderberg (D)	NFW
Venango VEN-25522	Titusville 4	Quaker State Oil Refining #1 McCaslin	3/20/78	6,060	Queenston (O)	DPT
Washington WAS-21147	Claysville 3	Pennzoil Company #1 Edgar Calvert	9/20/78	7,416	Helderberg (D)	DPT

* (D) = Devonian; (O) = Ordovician; (P) = Pennsylvanian

** NFW = new field wildcat; DPT = deeper pool test; SPT = shallower pool test

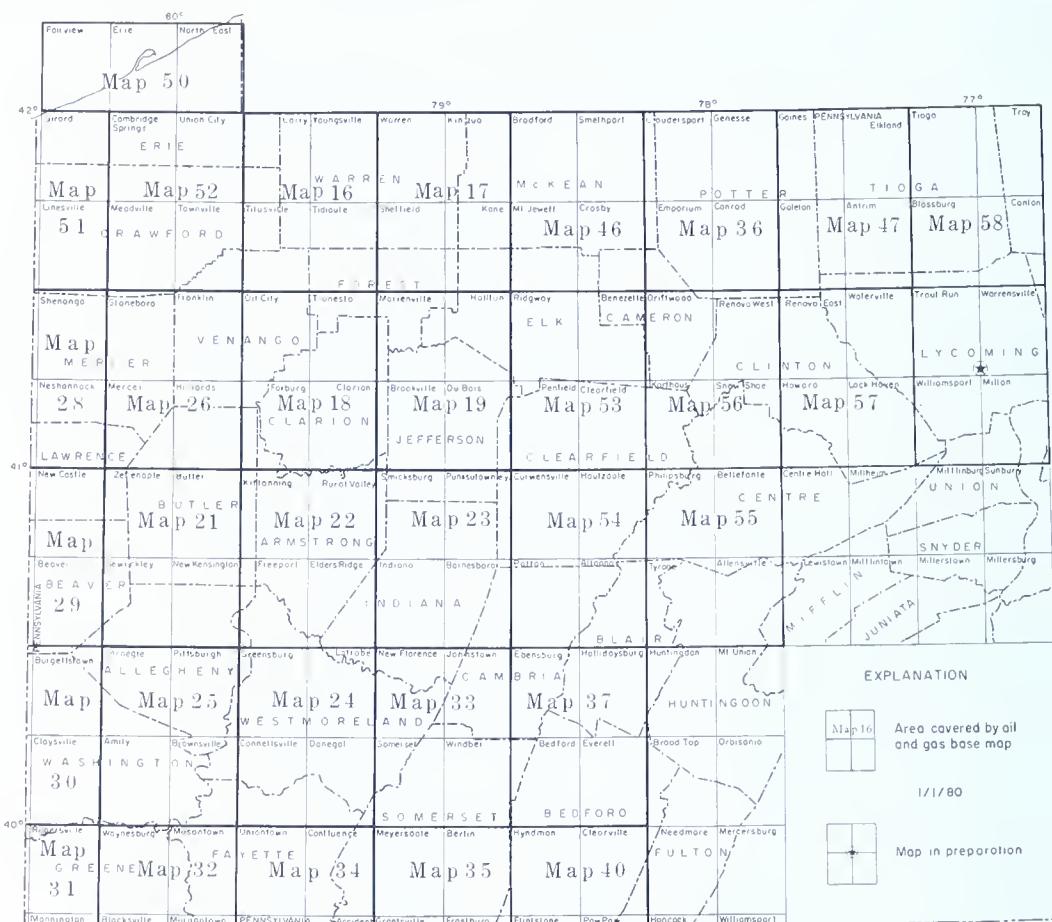


Figure 26. Index of available subsurface base maps

physical log and sample data are on file in the Survey's Oil and Gas Geology Division office in Pittsburgh. An index map near the legend shows the outlines of oil, gas, and gas storage fields within the mapped area, thus indicating the extent of areas of pre-1956 drilling. A list of field names is also included. All maps were updated in 1979.

Paper prints of the base maps may be obtained by writing to the State Book Store, P. O. Box 1365, Harrisburg, Pennsylvania 17125. The cost of each base map is \$0.50, plus a 6 percent sales tax to Pennsylvania residents. A check for the appropriate total amount, made payable to the Commonwealth of Pennsylvania, must accompany the order. When ordering, please specify the map number.

A cross index of state permit numbers and quadrangle map numbers used on the base maps is available from the Oil and Gas Geology Division of the Pennsylvania Geological Survey, 1201 Kossman Building, 100 Forbes Avenue, Pittsburgh, Pennsylvania 15222. This index is arranged by quadrangles. Please specify the quadrangle when requesting this literature.

PENNSYLVANIA OIL AND GAS FIELDS PROJECT

by John A. Harper and Christopher D. Laughrey

The Pennsylvania Geological Survey, Oil and Gas Geology Division, is being funded by the University of Oklahoma to update, standardize, and provide historical data on Pennsylvania's oil and gas fields. The two-year project involves three major tasks: (1) determination of the historical data (names, dates of discovery and production, geographic location) of all the fields in Pennsylvania; (2) determination of production reservoirs and the discovery and production dates, depths, and trap types for each field; and (3) encoding this information into the University of Oklahoma's computer system.

Determining the historical data has presented numerous problems. Some of the information has been lost with time, whereas other information is confused because different workers have used different names, dates, and geographic localities. Data were gathered from many documents, published and unpublished, from the Second, Third, and Fourth Pennsylvania Geological Surveys, the U. S. Geological Survey, and professional publications, as well as from well records, old well data cards, and other information in the Survey's files. The project requires not only the designation of fields, but also their definitions and limits. The reader is referred to previously published oil and gas fields maps (see Figure 27) to see how the fields have developed over the years. Boundaries between the fields and pools were designated in a semi-arbitrary fashion. The original producing areas of each field were determined and then common boundaries were chosen approximately halfway between them. The lines were drawn using key topographic and geographic features.

Determination of the producing reservoirs for each field requires looking at operators' well records and searching through old publications. The majority of the time spent during the first year of the project was used in designating the production reservoirs for each of the approximately 27,000 well records in the Survey's files and spotting this information on data compilation maps. The names used in this project for reservoirs are, for the most part, general group names. The reader should refer to the generalized stratigraphic charts compiled by Heyman (1977 and 1979) for these names. In addition, Figure 28 indicates the group names used in the fields map project for Mississippian and Upper Devonian reservoirs.

The final product of this project, a revised oil and gas fields map, will be unique to Pennsylvania in that it will show graphically the main producing reservoirs and boundaries for each field. The reservoirs will be indicated by various colors and patterns, resulting in a "geologic map" appearance. This will enable the viewer to see at a glance the major reservoirs in any area of interest. In addition, the oil fields will be patterned to distinguish them from

Figure 27. Previous Pennsylvania oil and gas fields maps

1. Carll, J. F., 1890. **Seventh report on the oil and gas fields of western Pennsylvania for 1887, 1888.** Pennsylvania Geological Survey, 2nd ser., v. 15, 356 p.
Plate 2 is an oil and gas fields map showing general outlines of the producing areas. Almost every field is oriented along structural trends.
2. Hice, R. R., 1916. **Oil and gas map of southwestern Pennsylvania.** Pennsylvania Geological Survey, 3rd ser., 22 p.
This unnumbered publication of the Third Survey accompanies a 1:250,000 scale map of the oil and gas fields south of latitude 41°15'N, and west of longitude 78°30'W. Fields are still oriented along structural axes, but are beginning to expand.
3. Ashley, G. H., and Robinson, J. F., 1922. **The oil and gas fields of Pennsylvania.** Pennsylvania Geological Survey, 4th ser., Mineral Resource Report 1, 79 p.
The first comprehensive report on the oil and gas fields of Pennsylvania and the first comprehensive report on oil and gas in general since Carll's work in the 1880's. Plate 1 is an oil and gas fields map showing the coalescing of shallow fields. The map also lists the producing reservoirs from each field.
4. Sisler, J. D., Ashley, G. H., Moyer, F. T., and Hickock, W. O., 1933. **Contributions to oil and gas geology of western Pennsylvania.** Pennsylvania Geological Survey, 4th ser., Mineral Resource Report 19, 94 p.
Four articles on oil and gas geology in Pennsylvania are presented with an accompanying oil and gas fields map. The fields map shows structure contours as well as the fields.
5. Lytle, W. S., and Fairall, Virginia, 1964. **Oil and gas fields of Pennsylvania.** Pennsylvania Geological Survey, 4th ser., Map 3, 1964 ed.
The map, which does not have an accompanying text, shows the distinction between shallow and deep fields for the first time.
6. Lytle, W. S., and Balogh, L. J., 1977. **Oil and gas fields of Pennsylvania.** Pennsylvania Geological Survey, 4th ser., Map 3, 1977 ed.
This most recent map includes pools and storage areas as well as fields.

gas fields. Field and pool boundaries will be added to graphically separate the formally named producing areas, and each field and pool will have a number or letter designation. Storage fields and pools are to be a single color as in the present fields map.

The project will be completed with the final drafting and printing of the oil and gas fields map. It is hoped that this map and the project that initiated it will offer some clarification and stability to the present and future designation of fields and pools in Pennsylvania, and to the classification of wells within them.

References

Heyman, Louis (1977), *Subsurface rock correlation diagram, Allegheny Plateau of Pennsylvania*, p. 29-32, in Lytle, W. S., and others, *Oil and gas developments in Pennsylvania in 1976*, Pennsylvania Geological Survey, 4th ser., Progress Report 190, 49 p.

_____(1979), *A subsurface rock correlation diagram, Allegheny Plateau of Pennsylvania*, p. 43-45, in Piotrowski, R. G., and others, *Oil and gas developments in Pennsylvania in 1978*, Pennsylvania Geological Survey, 4th ser., Progress Report 192, 61 p.

Piotrowski, R. G., and Krajewski, S. A. (1977), *Devonian research in Pennsylvania*, p. 33-42, in Lytle, W. S., and others, *Oil and gas developments in Pennsylvania in 1976*, Pennsylvania Geological Survey, 4th ser., Progress Report 190, 49 p.

SYSTEM	GROUP*	ZONE OR FORMATION**	SAND NAMES
MISSISSIPPIAN	POCONO		Loyahanna, Big Injun, Mountain, Burgoon, Shenango, Slippery Rock, Squaw, Second Gas, Berea, Cussawago, Cory, Knapp, Murrysville
	VENANGO	RICEVILLE ZONE D	Riceville Shale (north-central Pennsylvania)
			Venango First, Hundred Foot, Fifty Foot, Gantz, Drake, Tuna, Red Valley, Lyle, Rosenberry, White, Salamanca, Venango Second, Salt, Upper Nineveh, Lower Nineveh, Snee, Shira, Boulder, Venango Third Shale, Venango Third, Venango Fourth (Fourth), Venango Fifth (Fifth), Venango Sixth (Sixth), Grey, Black, Green, Gordon Shale, Gordon, McDonald Fourth, McDonald Fifth, Knox Third Shale, Knox Third, Knox Fourth, Knox Fifth, Wolf Creek, Clarion, Byram, Conewango, LeBoeuf, Magee Hollow, Bayard, Elizabeth, Sweet Richard
		PINK ROCK	D-B-B ^o
	BRADFORD	ZONE B	Warren First, Warren Second, Queen, Gladie, Bradford First, Eighty Foot, Clarendon Shale, Clarendon, Sugar Run, Watsonville, Dew Drop, Chipmunk, Cherry Grove, Garland, Upper Balltown, Lower Balltown, Speechley, Tiona, Cooper Shale, Cooper, Bradford Second, Klondike, Harrisburg Run, Deerliek, Silverville, Balltown (in Indiana County), Bradford Third (Bradford First in Indiana County), Lewis Run (Bradford Second in Indiana County), Upper Kane (Bradford Third in Indiana County), Lower Kane, Santwell
		ZONE B _o	Haskill, Reilly, Elk First, Elk Second, Elk Third, Elk Fourth, Elk Fifth, Humphrey, Benson, Alexander
	ELK		ZONE A
			Dunkirk Java West Falls Sonyea Genesee Hamilton
		"DEVONIAN SHALE"	
	MIDDLE DEV.	NIAG	
	UPPER DEVONIAN		
	DEVO.		
	CATSKILL		

* Group names as used for the new oil and gas fields map.

** Zone names as used by Piotrowski and Krajewski (1979); formation names as used by Piotrowski and Harper (1979).

Figure 28. Generalized stratigraphic column of producing sandstones in the Devonian of Pennsylvania. Position of most sand names within the group or zone refers only to the position of the sand in the area where it was first named or used (modified from Piotrowski and Krajewski, 1977, and from Piotrowski and Harper, 1979).

Piotrowski, R. G., and Harper, J. A. (1979), *Black shale and sandstone facies of the Devonian "Catskill" clastic wedge in the subsurface of western Pennsylvania*, METC/EGSP Series #13, Morgantown, West Virginia, 40 p.

ORISKANY SANDSTONE PROJECT

by Kathleen D. Abel and Louis Heyman

A regional study of the Oriskany sandstone in the subsurface of Pennsylvania by Kathleen D. Abel and Louis Heyman was completed this year and is scheduled for publication in late 1980. The study is based on gamma-ray log correlations of all available wells in Pennsylvania that penetrate the Oriskany.

A Ridgeley format based on gamma-ray log signature and including the Oriskany sandstone has been defined and traced northward from the type Ridgeley in West Virginia. The correlations show that the Ridgeley thins from southeast to northwest and pinches out along a line between Lawrence and Potter Counties. Some Oriskany fields such as the Penfield field, Clearfield County, and the Elk Run pool, Jefferson County, are apparently related to stratigraphic entrapment along the Ridgeley pinchout. Future production may be related to the pinchout in Armstrong, Butler, and Lawrence Counties, especially along anticlinal axes.

Most other Oriskany fields are related to structure. The most recent discoveries are in Somerset County, and further production is anticipated there. Northwest of the Ridgeley pinchout, sandstone at the Oriskany horizon (probably basal Onondaga) is patchy. Although there are a few Oriskany fields northwest of the pinchout, production is unpredictable because of the patchiness of the sandstone and because most wells there encounter saltwater at the Oriskany horizon. However, the Oriskany of northwestern Pennsylvania should not be ruled out as a possible secondary target.

The following maps at a scale of 1:1,000,000 are the final products of the Oriskany project; they are now available on open file at the Pennsylvania Geological Survey, Oil and Gas Geology Division.

- 1) Ridgeley isopach and sub-Onondaga subcrop map
- 2) Sandstone thickness map
- 3) Oriskany production map
- 4) Drilling depth map (shows depth to top of Oriskany)

LOWER SILURIAN MEDINA SANDSTONE GROUP PROJECT, NORTHWESTERN PENNSYLVANIA

by Robert G. Piotrowski

The Lower Silurian Medina Sandstone Group is one of the most actively drilled targets for natural gas in Pennsylvania. In 1979, 128 gas wells were

successfully completed in Erie County alone in this horizon. The Medina Group sandstone will also be the primary target for drilling in the Pennsylvania portion of Lake Erie, which may soon be opened for exploration.

The objectives of the Oil and Gas Geology Division's study of this stratigraphic unit were to understand the regional stratigraphy of the Lower Silurian clastics in Pennsylvania with emphasis on the Medina Group sands in northwestern Pennsylvania, to map current gas production from the Medina Group in northwestern Pennsylvania, to understand the geology of the Medina Group, and to aid drillers in its future development.

The study consists first of a series of nine regional cross sections. The purpose of the cross sections is to define the regional mapping units in northwestern Pennsylvania, show their distribution, and indicate their equivalency to units in Ohio, New York, and across Lake Erie into Canada. The cross sections also tie the Lower Silurian Medina Group sandstones to the equivalent Lower Silurian Tuscarora sandstones in central Pennsylvania. Figure 29 shows the distribution of this cross-section network, and the distribution of the Medina and equivalent facies.

A series of eleven maps were also constructed for northwestern Pennsylvania detailing the Lower Silurian clastics. The maps include: (1) gas production from the Medina Group in northwestern Pennsylvania; (2) drilling depth map to the top of the Queenston; (3) structure on top of the Queenston; a series of isopach maps including (4) isopach of the Clinton Group, (5) isopach of the Medina Group, (6) isopach of the Whirlpool sandstone, (7) isopach of the Cabot Head shale, (8) isopach of the Grimsby sandstone; and a series of sandstone quality maps including (9) and (10) net sand isolith maps (50 percent and 75 percent gamma-ray sand cutoff) of the Medina Group, and (11) sand/shale ratio map of the Medina Group.

All eleven maps detailing the Lower Silurian clastics in northwestern Pennsylvania will be published at a scale of 1:500,000. The cross-section network will not be published but will be available as open-file material at the Survey's office in Pittsburgh. Publication of this report is anticipated in late 1980 upon completion of drafting and review. Prior to publication, the report data are available for inspection at the Pittsburgh office of the Survey.

OPEN-FILE REPORTS AND OTHER DATA AVAILABLE

The following reports and other data are available on open file at the Pennsylvania Geological Survey, Oil and Gas Geology Division, 1201 Kossman Building, 100 Forbes Avenue, Pittsburgh, Pennsylvania 15222.

(1) *Surface to Middle Devonian (Onondagan) Stratigraphy, Part I (STOMDES)* (1972), by D. R. Kelley and W. R. Wagner. 15 p., 8 cross sections, vertical scale 1 inch = 100 feet.

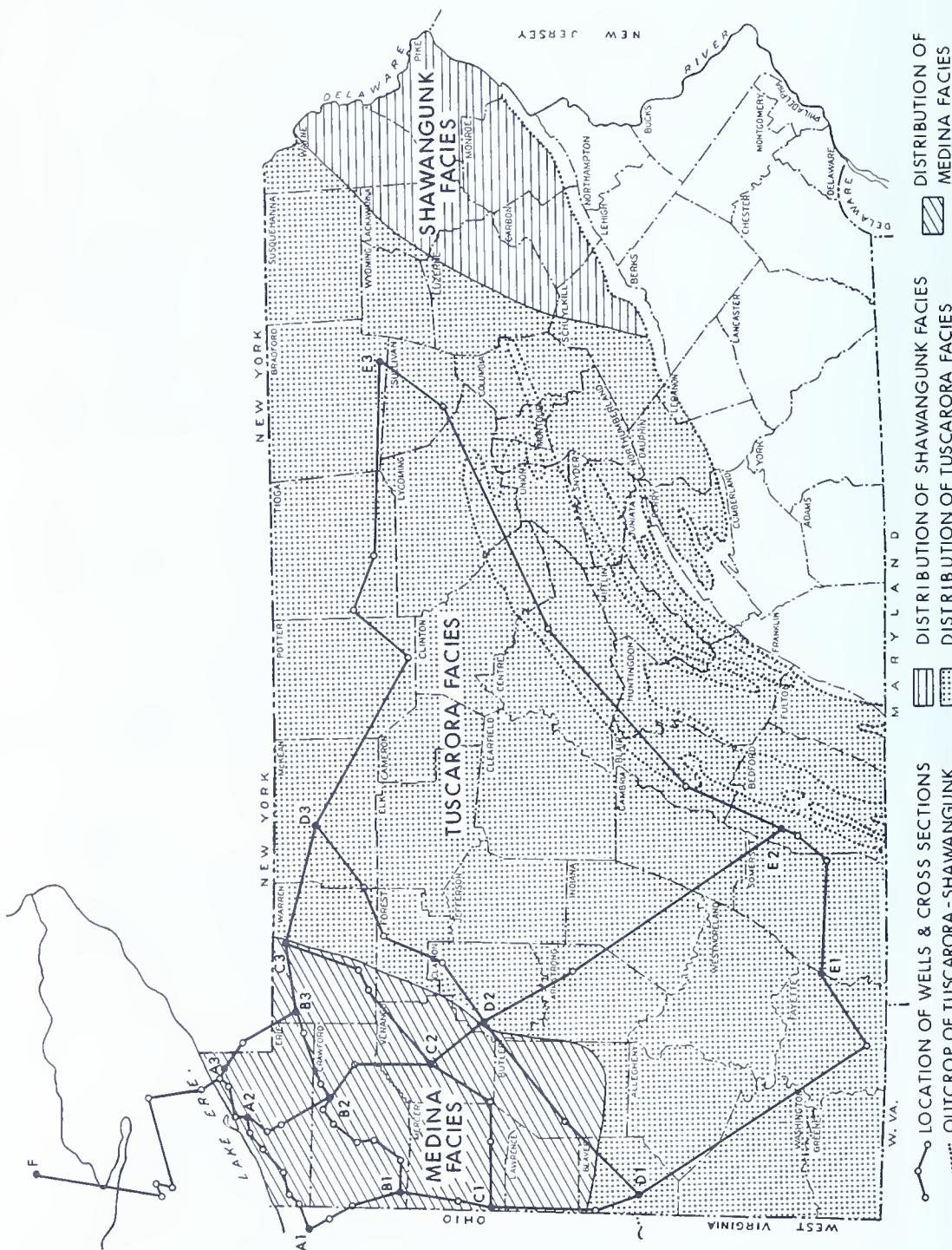


Figure 20. Lines of terminal numbers in *Leptothrix* and *Leptothrix-like* bacteria.

(2) *Deep sand exploration and gas developments in Pennsylvania (1973)*, by Lillian A. Heeren. 1 map in 6 sheets, scale 1:250,000.

(3) *Salina or equivalent and deeper penetrations of Pennsylvania (1973)*, by D. R. Kelley and L. J. Balogh. 1 map, scale 1:500,000.

(4) *Tully and deeper formations, brine analyses of Pennsylvania (1973)*, by D. R. Kelley and L. A. Heeren. 1 chart and map, scale 1:500,000.

(5) *Stratigraphic framework of the Greater Pittsburgh area, Parts 1 and 2 (1972)*, by W. R. Wagner and W. S. Lytle. 20 p., 9 sections in 13 sheets.

(6) *Active gas storage fields map of Pennsylvania*, by L. J. Balogh, 1 map, scale 1:500,000.

(7) *A subsurface rock correlation diagram, surface to basement, Allegheny Plateau of Pennsylvania*, by Louis Heyman.

Also on open file at the Pennsylvania Geological Survey's Pittsburgh office are over 27,800 drillers' logs, along with 3,075 mechanical logs; a Sample Library containing approximately 1,200 wells, 90 of which are out-of-state wells; and a Core Library containing cores on approximately 40 wells.

ACTIVITIES OF THE OIL AND GAS REGULATORY DIVISION

SUMMARY OF REGULATORY FUNCTIONS

by John A. Ifft

The Division of Oil and Gas Regulation administers several different laws affecting the oil and gas industry. Act 225 provides for permitting of oil and gas wells, the underground storage of gas, mining around wells, and the methods of casing and plugging oil and gas wells. Act 359, the Oil and Gas Conservation law, pertains only to the deeper producing horizons, and provides for the spacing of oil and gas wells, unitization of interests, and the protection of the correlative rights of oil and gas owners. Act 38 relates to the underground storage of gas and the protection of the people residing in the area.

Figures 30 and 31 summarize the work of the Division during 1979.

ACTIVITIES OF THE NATURAL GAS POLICY ACT (N.G.P.A.) SECTION

by Charles H. Updegraff

The Bureau's Division of Oil and Gas Regulation started mailing information and forms relative to the Natural Gas Policy Act of 1978 (N.G.P.A.) on November 15, 1979. This Act was part of a total National

Figure 30. Summary of activities of the Oil and Gas Regulatory Division, 1956-1979

	Cumulative from 1956-1969							Grand total						
	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1956-79			
1. Drilling permits issued in coal areas	4,394	322	342	469	694	648	916	782	1,166	1,429	1,332	12,494		
2. Drilling permits issued coal areas, Act 359	224	16	10	16	11	15	26	12	27	21	42	420		
3. Total wells, coal areas (items 1 and 2)	4,618	338	352	485	705	663	942	794	1,193	1,450	1,374	12,914		
4. Drilling permits issued in noncoal areas	1,103	914	956	1,247	1,522	1,364	1,042	1,381	1,510	1,806	2,348	15,193		
5. Drilling permits issued noncoal areas, Act 359	214	9	12	37	61	34	23	15	51	93	182	731		
6. Total permits issued (items 3, 4, and 5)	5,935	1,261	1,320	1,769	2,288	2,061	2,007	2,190	2,754	3,349	3,904	28,838		
7. Reported wells in noncoal areas — file numbers issued	8,202*	27*	2*	10*	0	0	0	0	0	0	0	0	8,241*	
8. Total wells, noncoal areas (items 4, 5, and 7)	9,519	950	970	1,294	1,583	1,398	1,065	1,396	1,561	1,899	2,530	24,165		
9. Total wells, coal and noncoal areas (items 6 and 7)	14,137	1,288	1,322	1,779	2,288	2,061	2,007	2,190	2,754	3,349	3,904	37,079		
10. Total drilling permits issued, Act 359 (items 2 and 5)	438	25	22	53	72	49	49	27	78	114	224	1,151		
11. Drilling cancelled — permits and noncoal file numbers	1,108	244	236	169	327	597	383	667	469	412	467	5,079		
12. Plugging numbers issued	6,374	1,721	1,383	1,860	1,681	1,511	1,630	1,959	1,300	2,057	1,225	22,701		
13. Plugging numbers cancelled	318	119	116	83	180	112	119	92	71	60	66	1,336		
14. Wells reported plugged and abandoned	5,142	992	1,573	1,317	1,410	1,089	1,284	1,493	1,144	991	1,307	17,742		
15. Pillar permits issued	2,131	164	105	142	96	96	94	104	125	83	150	3,290		
16. Pillar permits cancelled	18	0	0	1	0	1	0	2	0	0	0	22		

Act 359 of 1961 — Oil and Gas Conservation Law, approved July 25, 1961. Effective date September 25, 1961.

*Prior to September 30, 1968, permits were not required for wells in noncoal areas, except those wells coming within purview of Act 359 of 1961.

Act 265, approved July 31, 1968, effective September 30, 1968 — requires permits to be issued for all wells.

Figure 31. Summary of activities of the Oil and Gas Regulatory Division by county, 1979

County	Permits issued coal areas	Permits issued noncoal areas	Drilling cancelled	Plugging numbers issued	Plugging cancelled	Wells reported	Pillar permits issued	DRILLING PERMITS ISSUED		
								Act 359 of 1961	Coal areas	Noncoal areas
Allegheny	25	2	6	2	0	8	7	0	0	0
Armstrong	147	0	25	6	0	6	36	0	0	0
Beaver	0	11	0	0	0	0	0	0	0	0
Bedford	0	0	0	1	0	2	0	0	0	0
Butler	10	3	0	5	0	2	24	0	0	0
Cambria	4	0	10	0	0	1	0	0	0	0
Cameron	0	2	0	1	0	0	0	0	0	0
Centre	4	1	4	1	0	0	0	0	2	3
Clarion.	29	30	8	19	5	21	0	2	0	0
Clearfield.	69	0	33	5	0	5	0	3	0	0
Clinton.	0	9	0	1	0	1	0	0	0	0
Crawford.	0	91	6	4	0	2	0	0	0	45
Elk.	0	86	2	54	3	22	0	0	0	0
Erie.	0	261	52	10	2	2	0	0	0	108
Fayette.	14	2	10	2	0	3	0	1	1	1
Forest.	0	302	58	61	2	33	0	0	0	1
Greene.	16	0	4	12	0	6	29	0	0	0
Indiana.	644	0	31	11	0	5	20	4	0	0
Jefferson.	137	27	55	29	1	18	1	0	1	0
Lawrence.	1	0	0	0	0	0	0	1	0	0
McKean.	0	384	21	539	49	763	0	0	1	0
Mercer.	0	19	4	0	0	0	0	0	0	0
Northumberland	1	0	0	0	0	0	0	1	0	0

Figure 31. (Continued)

County	Permits issued coal areas	Permits issued noncoal areas	Drilling cancelled	Plugging numbers issued	Plugging cancelled	Wells reported	Pillar permits issued	DRILLING PERMITS ISSUED	
								Act 359 of 1961	Coal Noncoal areas
Potter.....	0	20	8	5	0	6	0	0	0
Somerset.....	25	0	2	4	0	2	0	25	0
Tioga.....	0	11	0	3	0	3	0	0	0
Venango.....	3	798	41	212	1	234	0	0	1
Warren.....	0	470	27	221	2	150	0	0	12
Washington.....	59	1	19	3	0	2	30	3	0
Westmoreland.....	186	0	41	14	1	10	3	0	0
Total	1,374	2,530	467	1,225	66	1,307	150	42	182

Energy Plan signed into law by President Carter on November 9, 1978, and the effective date was December 1, 1978. The Federal Energy Regulatory Commission (FERC) was empowered to administer the Act by adopting rules and regulations consistent with the provisions of the Act. The Act provides a gradual move toward price deregulation by 1985 of new discovered gas, with specified price increases for all categories of natural gas determined by well classification. It was necessary to obtain Pennsylvania legislative authority for a state agency to make well classifications as required by FERC. This authority was granted to the Department of Environmental Resources by Act 21, signed into law by Governor Thornburgh on June 28, 1979. Implementation of the Act was assigned to the Bureau of Topographic and Geologic Survey's Division of Oil and Gas Regulation.

The Bureau then prepared regulations based on the federal Act, detailing the procedures that Pennsylvania producers must follow to qualify for well classification. These regulations were passed by the Environmental Quality Board on October 23, 1979, effective upon publication in the Pennsylvania Bulletin on November 3, 1979.

The function of the staff will be to process the applications by examining the data submitted by each applicant to justify the category for which he seeks a determination. The staff will be involved in reviewing classification requests for four major categories: "New Natural Gas," "New Onshore Production Well," "High Cost Gas," and "Stripper Well," three of which have several subcategories. Each category has a different allowable maximum ceiling price set by federal law. It is the staff's obligation to assure that the data submitted with each application are sufficient to meet the federal criteria for the well classification that is requested by the applicant.

A backlog of approximately 4,000 applications is on file, and many more applications are anticipated. A \$30.00 filing fee to cover the state cost of administering the program is required for each well determination application. In addition, a FERC form and Pennsylvania forms must be completed and submitted along with geologic, engineering, and production data to support the requested classification.

Figure 32 lists the actions taken by the staff in making well-classification determinations for the year of 1979.

Figure 32. Well-classification determinations made under the Natural Gas Policy Act

<i>No. of applications</i>	<i>Category</i>	<i>Approved</i>	<i>Disapproved</i>
2	102	2	0
313	103	284	29
193	108	193	0

SUMMARIZED RECORDS OF REPORTED DEEP WELLS IN 1979 THAT PENETRATED ROCKS OF MIDDLE DEVONIAN OR OLDER AGE

The information in Figure 33 has been compiled mainly from drillers' logs, location plats, and geophysical logs received from the Oil and Gas Regulatory Division. Other sources are Petroleum Information Corporation (PI), and personal communications with oil and gas operators. Wells are filed with the Oil and Gas Regulatory Division by permit numbers. The Oil and Gas Geology Division assigns a file number which appears on the Survey's published and open-file maps.

A single asterisk appearing on a record indicates that all formation tops and total depths were picked from a geophysical log. A record without an asterisk means that the formation tops and total depths are from the driller's log. A double asterisk precedes the 7-1/2-minute-quadrangle name and location. The tables are listed alphabetically by county and by name of well.

33. Summarized records of reported deep wells in 1979 that penetrated rocks of Middle Devonian or older age

SUMMARIZED RECORDS OF DEEP WELLS

COUNTY	Permit Number	Bedford	Bedford	Bedford	Clarion	Clearfield	Clinton	Crawford	Crawford
NAME OF WELL	Jack E. Colledge #1	20053	20057	20056	20751	2097	2098	20560	20561
OPERATOR	Consolidated Gas Supply Corp., Wk-1702	Adobe Oil & Gas Corporation	Columbia Gas Transmission Corp	Peoples natural Gas company	North Penn Gas #7	Rachel Garland #IA	Alice Pollok #IA	James & Helen Anderson #3	James & Helen Anderson #5
TOWNSHIP	E. Providence	Lincoln	Nam	Farmington	Bougs	Texaco, Inc.	Consolidated Gas Supply Corp.	Wainoco Oil & Gas Company	Wainoco Oil & Gas Company
QUADRANGLE	MAP # NUMBER	Broad Top G.3 **Nells Tannery	Bedford B. 5 **Oglefert	Paw Paw 6 **Artemas	Tionesta F. 2 **Tysersburg	Hontdale C. 13 **Wallacetown	Penfield H. 290 **Tamarack	Townville C. 5 **Centerville	Townville A. 10 **Centerville
LATITUDE	40°05'00"	40°05'00"	40°15'00"	39°45'00"	39°45'00"	41°05'00"	41°45'00"	41°45'00"	41°45'00"
LONGITUDE	78°12'30"	78°12'30"	78°37'30"	78°25'00"	78°25'00"	78°17'30"	78°37'30"	78°45'00"	78°45'00"
DATE COMPLETED	3-31-79	7-12-78	7-19-78	4-17-79	6-25-79	6-24-78	4-6-79	1-10-79	1-30-79
ELEVATION	1437 kB	1825 GR	1143 GR	1637 kB	2117 kB	1874 kB	1839 GR	1419 kB	1596 kB
TULLY	Mahantango Fm-5145-	*5315-	3702-	*5087-	7070-	*6502-	*5676-	*3186-	*3316-
ONONDAGA	LIMESTONE	6364-	5519-5545	5384-		7166-	6452	3420-	3551-
	CHERT	6025-				7176- SG		3616	
ORISKANY		6459-	5705-5927			8100	7233-	6468-	Absent
HELDERBERG		6525-	5927-			Gas @8100-8105			Absent
KEYSER-BASS ISLAND									
SALINA									
GUELPH-LOCKPORT									
BLACK WATER									
CLINTON	IRONDEQUOIT								
MEINA	WHIRLPOOL								
QUEENSTON									
TOTAL DEPTH	7853	6585	5927	7316	8180	7239	6600	4990	5088
DEEPEST FORMATION REACHED	Mahantango	Helderberg	Oriskany	Oriskany	Helderberg				
CARRIER	Run Shale	Dry and abandoned new field wildcat	Dry development Artemas field Artemas pool	Dry and abandoned new field wildcat	Dry and abandoned new field wildcat				
RESULT	Member 7/53	Dry and abandoned new field wildcat	Dry development Artemas field Artemas pool	Dry and abandoned new field wildcat	Dry and abandoned new field wildcat				

Figure 33. (Continued)

COUNTY	Permit Number	Crawford 20580	Crawford 20609	Crawford 20675	Crawford 2069	Crawford 2069	Crawford 20565	Crawford 20588	Crawford 0510	Crawford 20590	Crawford 20628	Crawford 2059	Crawford 20576
NAME OF WELL	George Clark #1	Troy C. Ehrhart	Joseph Gajdowski #1	Leota Hinebaugh #6	Lee A. Hopkins #1	Nick Kats Las #2	Joseph & Helen Klefert #1	Milton Payne #2	Ernest & Valerie Post #1	Jack N. Preston #1			
OPERATOR	Wainoco Oil & Gas Company	Wainoco Oil & Gas Company	Flanigan Bros.	Wainoco Oil & Gas Company	Wainoco Oil & Gas Company	Meridian Oil & Gas Enterprises	B & G Gas Company	Flanigan Bros.	Wainoco Oil & Gas Company	Wainoco Oil & Gas Company			
TOWNSHIP	Athens	Cuissewago	Athens	Union City 137	Union City 135	**Lake Canadota	**Spartaburg	Spring	Girard E. 477	Townville C 8	Union City I 38		
QUADRANGLE & MAP NUMBER	**Centerville	Cambridge S9S 642	2,600 ft. S	14,300 ft. S	6,650 ft. S	7,560 ft. S	11,650 ft. S	13,050 ft. S	**Girard E. 479	**Centerville	**Lake Canadota		
LATITUDE	2,950 ft. S 41°45'00"	10,850 ft. S 41°47'30"	2,600 ft. S 41°47'30"	14,300 ft. S 41°47'30"	6,650 ft. S 41°47'30"	7,560 ft. S 41°45'00"	11,650 ft. S 41°45'00"	13,050 ft. S 41°42'30"	**Girard E. 479	Townville C 8	Union City I 38		
LONGITUDE	11,200 ft. W 79°45'00"	4,950 ft. W 79°47'30"	4,450 ft. W 0°12'30"	3,200 ft. W 79°47'30"	7,150 ft. W 79°37'30"	6,800 ft. W 80°20'00"	3,450 ft. W 80°20'00"	9,250 ft. W 80°20'00"	**Girard E. 479	**Centerville	**Lake Canadota		
DATE COMPLETED	5-27-79	4-26-79	10-1-79	3-1-79	6-27-79	11-30-77	11-21-79	10-5-79	**Girard E. 479	Townville C 8	Union City I 38		
ELEVATION	1,601 KB	1,559 KB	1,139 DF	1,611 KB	1,611 KB	1,348 GR	1,139 DF	1,164 DF	**Girard E. 479	**Centerville	**Lake Canadota		
TILLY	*3361-	*3210-		*3342-	*3436-3528		*2126-2164		*3414-3560		*3224-3300		
ONONDAGA LIMESTONE	35594-	3443-		3,580-	3,688-4096		*2786-		3640-		3456-		
OLISKANY CHERT	Absent	Absent		Absent	Absent		Absent	2546-2552	Absent	Absent	3920		3890
HELDERBERG				*3650-3724									
KEYSER-BASS ISLAND ST. LINA													
GELPH-LOCKPORT BLACK WATER													
CINTON IRONDEQUOIT	4714-4771	4556-4610	4610-	3724-	4750-4802	4826-4934	4060-	3515-3542	3410-3511	3175-3410			
MEDINA WHIRLPOOL	4822-	4664-	Gas 04830-4994	Gas 04820-3850	Gas 0482-4914	Gas 0483-4891	4085-	3542-	3343-3632	3650-	4060-4911	4650-4702	4590-4650
QUEENSTON	5000-5166	4834-5102	3942-	4976-	5104-5260	5277-	5004-5104	Gas 04310-4178	Gas 03382-5018	Gas 0333-3674	4702-	4650-4702	4590-4650
TOTAL DEPTH	5166	4902		3957	5090		5260	4315	3762-	5090-5182			
DEEPEST FORMATION REACHED	Queenston	Queenston	Queenston	Queenston	Queenston	Queenston	Queenston	Queenston	Queenston	Queenston	Queenston	Queenston	Queenston
RESULT	3,100 ft. AF 1,350 psi/72 hrs.	2,800 ft. AF 1,300 psi/72 hrs.	4,360 Mcf AF 1,150 psi/72 hrs.	1,300 Mcf AF 1,100 psi/70 days	1,420 psi/72 hrs.	1,180 Mcf AF 1,050 psi/13 days	1,800 Mcf AF 1,020 psi/ days	1,500 Mcf AF 1,020 psi/ days	1,839 Mcf AF 1,050 psi/10 days	1,040 psi/48 hrs.	839 Mcf AF 1,040 psi/48 hrs.	6,023 Mcf AF 1,040 psi/72 hrs.	
	development Athens field	development Athens field	development Athens field	development Athens field	Brinstone pool	Brinstone pool	Brinstone pool	Brinstone pool	Brinstone pool	Lundy's Lane pool	Lundy's Lane pool	Brinstone pool	Brinstone pool
					Koneaut field	Koneaut field	Koneaut field	Koneaut field	Koneaut field	Church Run field	Church Run field	Koneaut field	Athens field

SUMMARIZED RECORDS OF DEEP WELLS

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Figure 33. (Continued)

County	Permit Number	Erie	Erie	Erie	Erie	Erie	Erie	Erie	Erie	Erie	Erie
NAME OF WELL	20650	20637	20753	20864	20819	20793	20799	20606	20718	20708	Erie
OPERATOR	Theodore Bauer #3	Carl Beckman #3A	Carl H. Beebe #1	Carl Beebe #2	Carl Bantis #1	Carl Bantis #2	G. & I. Bindley #1	Genvieve Blair #1	George Blasko #1	George Blasko #2	George Blasko
TOWNSHIP	Envirogas, Inc	Envirogas, Inc	Envirogas, Inc	Envirogas, Inc	Envirogas, Inc	Vineyard 011 & Gas Company	Envirogas, Inc	Envirogas, Inc	Envirogas, Inc	Envirogas, Inc	Envirogas, Inc
QUADRANGLE & MAP NUMBER	North East D 168 **Harborcreek	North East E 212 **Harborcreek	North East E 233 **Harborcreek	North East E 210 **North East	North East E 222 **North East	North East E 177 **Nat'lburg	North East D 185 **Hammert	North East D 203 **Hammert	North East D 203 **Hammert	North East D 203 **Hammert	North East D 203 **Hammert
DEPTH	4,500 ft. S 42° 10' 00"	9,250 ft. S 42° 10' 00"	10,100 ft. S 42° 10' 00"	6,500 ft. S 42° 10' 00"	7,500 ft. S 42° 10' 00"	650 ft. S 42° 12' 30"	2,050 ft. S 42° 01' 30"	3,250 ft. S 42° 07' 30"	6,100 ft. S 42° 07' 30"	6,100 ft. S 42° 07' 30"	6,100 ft. S 42° 07' 30"
LONGITUDE	6,100 ft. W 79° 55' 00"	10,300 ft. W 79° 52' 30"	5,100 ft. W 79° 52' 30"	11,050 ft. W 79° 50' 00"	9,150 ft. W 79° 50' 00"	5,150 ft. W 79° 50' 00"	7,550 ft. W 79° 55' 00"	5,350 ft. W 79° 55' 00"	5,600 ft. W 79° 55' 00"	5,600 ft. W 79° 55' 00"	5,600 ft. W 79° 55' 00"
DATE COMPLETED	12-14-78	11-3-78	7-18-79	9-18-79	7-1-79	6-23-79	11-23-78	3-27-79	4-3-79	4-3-79	4-3-79
EL ELEVATION	864 KB	1380 GR	1380 GR	1400 KB	1405 GR	788 0F	1460 KB	1295 KB	1325 KB	1325 KB	1325 KB
VALLEY	*1403-	*1422-	*1976-	*1960-	*1980-	*2007-	*1280-	*2133-	*1897-	*1928-	*1928-
ONONDAGA LIMESTONE	1624- CHERT	1649-	2206-	2194-	2204-	2228- Gas	1445-	2360-	2129-	2162-	2162-
OLISKANY	Absent	Absent	Absent	Absent	Absent	2439-2460	Absent	Absent	Absent	Absent	Absent
HEIDERBERG	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent
HEYSEY-BASS ISLAND	1873-2184	1900-1988	2449-2570	2436- 2552-	2460- 2566-	1695-1845	2603-2720	2366-2517	2366-2517	2366-2517	2366-2517
SILINA	2184-	1988-	2570-	2570-	2570-	1845-	2720-	2517-	2517-	2517-	2517-
GELPH-LOCKPORT	2344-	2339-	2931-	2918-	2929-	2231- 2411	3096-	2878-	2878-	2878-	2878-
BLACK WATER											
CINTON	2605-2660	2621-2672	3187-3243	3176-3228	3196-3238	2411-2466	3362-3403	3138-3183	3169-3220	3169-3220	3169-3220
IRONDEQUOIT	2660-2707	2672-2718	3243-	3228-	3228-3284	2466-2493	3403-3448	3183-	3220-3265	3220-3265	3220-3265
MEDINA	Gas 2707-2744	Gas 2718-2781	Gas 3268-3370	Gas 3253-3372	Gas 3224-3378	2483- Gas 03524-2553	3449- Gas 03524-3545	324- Gas 03236-3331	3225- Gas 03239-3413	3225- Gas 03239-3413	3225- Gas 03239-3413
WHIRLPOOL	Gas 2832-2849	Gas 2844-2862	Gas 3415-3435	Gas 3404-3420	Gas 3412-3435	Gas 3582- Gas 2635-2658	Gas 3582- Gas 2635-2658	Gas 3582- Gas 3582-	Gas 3582- Gas 3582-	Gas 3582- Gas 3582-	Gas 3582- Gas 3582-
QUEENSTON	2849-	2862-	3435-	3420-	3435-	2658-	2658-	3598-	3382-	3416-	3416-
TOTAL DEPTH	2956	2946	3516	3489	3525	2410	2720	3673	3469	3502	3502
DEPT PEST FORMATION REACHED	Queenston	Queenston	Queenston	Queenston	Queenston	Onondaga	Onondaga	Queenston	Queenston	Queenston	Queenston
RESULT	14 Mcf AF 680 psi/10 days development	60 Mcf AF 1,010 psi/10 days development	782 Mcf AF 900 psi/10 days development	551 Mcf AF 950 psi/10 days development	1,200 Mcf AF 950 psi/10 days development	11,400 Mcf AF 816 psi/10 days development	10,120 Mcf AF 816 psi/10 days development	16 Mcf AF 995 psi/10 days development	473 Mcf AF 995 psi/10 days development	1,030 psi/10 days development	1,030 psi/10 days development
	Harborcreek pool Erie field	Burressa pool North East field	Burressa pool North East field	Burgess pool North East field	Burgess pool North East field	Onondaga shallower Burgess pool	Orchard Beach Burgess pool	Hornby pool North East field	North East field	Harborcreek pool North East field	Harborcreek pool North East field

SUMMARIZED RECORDS OF DEEP WELLS

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Figure 33. (Continued)

SUMMARIZED RECORDS OF DEEP WELLS

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COUNTY	Permit Number	Erie	20649	Erie	20792	Erie	20558	Erie	20731	Erie	20800	Erie	20704	Erie	20732	Erie	20778	Erie	20833	Erie	20790
NAME OF WELL	Alvin Eliason #1	Frank Fret #1	Robert Evans #1	O. Falkowski #1	John Fidorra #1	James Fiske #1	James Fiske #1	John Fidorra #1	James Fiske #1	James Fiske #1	James Fiske #1	James Fiske #1	James Fiske #1	James Fiske #1	James Fiske #1	James Fiske #1	James Fiske #1	James Fiske #1	Lawrence Gehres #1	Thomas Graczyk #2	
OPERATOR	Envirogas, Inc	Envirogas, Inc	Envirogas, Inc	Envirogas, Inc	Envirogas, Inc	Envirogas, Inc	Envirogas, Inc	Envirogas, Inc	Envirogas, Inc	Envirogas, Inc	Envirogas, Inc	Envirogas, Inc	Envirogas, Inc	Envirogas, Inc	Envirogas, Inc	Envirogas, Inc	Envirogas, Inc	N.E.A. Cross Company	Envirogas, Inc	Envirogas, Inc	
TOWNSHIP	Summit	Greenfield	Harborcreek	Greenfield	Harborcreek	Harborcreek	Harborcreek	Harborcreek	Harborcreek	Greene	Greene	Greene	North East	North East	LeBoeuf	LeBoeuf	LeBoeuf	Greenfield	Greenfield	Greenfield	
QUADRANGLE & NUMBER	Erie I-138 **Erie South	North East E 221 **Harborcreek	North East 0 149 **Hammett	North East 0 149 **Hammett	North East E 232 **Harborcreek	North East 6 202 **Hammett	North East 6 191 **Hammett	North East 6 191 **Hammett	North East 6 191 **Hammett	North East E 220 **North East	North East E 42 **Waterford	North East E 42 **Waterford	North East E 220 **North East	North East E 42 **North East	North East E 42 **North East	North East E 42 **North East	North East E 42 **North East	North East E 213 **Hammett	North East E 213 **Hammett		
LATITUDE	42°05' ft. S 42°05' 00"	10,550 ft. S 10,550 ft. 00"	1,150 ft. S 1,150 ft. 00"	2,300 ft. S 2,300 ft. 00"	6,550 ft. S 6,550 ft. 00"	13,500 ft. S 13,500 ft. 00"	13,550 ft. S 13,550 ft. 00"	2,500 ft. S 2,500 ft. 00"	7,400 ft. S 7,400 ft. 00"	5,700 ft. S 5,700 ft. 00"	5,700 ft. S 5,700 ft. 00"	5,700 ft. S 5,700 ft. 00"	5,700 ft. S 5,700 ft. 00"	5,700 ft. S 5,700 ft. 00"	5,700 ft. S 5,700 ft. 00"	5,700 ft. S 5,700 ft. 00"	5,700 ft. S 5,700 ft. 00"	5,700 ft. S 5,700 ft. 00"	5,700 ft. S 5,700 ft. 00"		
LONGITUDE	79°52' 30" W 79°52' 30"	1,950 ft. N 1,950 ft. 00"	950 ft. W 950 ft. 00"	9,200 ft. W 9,200 ft. 00"	5,950 ft. W 5,950 ft. 00"	11,100 ft. W 11,100 ft. 00"	11,100 ft. W 11,100 ft. 00"	10,550 ft. W 10,550 ft. 00"	5,100 ft. W 5,100 ft. 00"	2,650 ft. W 2,650 ft. 00"	2,650 ft. W 2,650 ft. 00"	2,650 ft. W 2,650 ft. 00"	2,650 ft. W 2,650 ft. 00"	2,650 ft. W 2,650 ft. 00"	2,650 ft. W 2,650 ft. 00"	2,650 ft. W 2,650 ft. 00"	2,650 ft. W 2,650 ft. 00"	2,650 ft. W 2,650 ft. 00"	2,650 ft. W 2,650 ft. 00"		
DATE COMPLETED	2-19-79	6-18-79	10-27-78	3-21-79	10-31-79	3-7-79	3-7-79	3-7-79	3-20-79	5-20-79	8-25-79	8-25-79	8-25-79	8-25-79	8-25-79	8-25-79	8-25-79	7-11-79	7-11-79		
ELEVATION	1320 kB	1435 GR	1160 kB	1220 kB	1270 kB	1360 kB	1360 kB	1360 kB	1360 kB	1354 kB	1285 kB	1285 kB	1239 kB	1239 kB	1239 kB	1239 kB	1239 kB	1515 kB	1515 kB		
TULLY	*1990-	*2044-	*1727-	*1801-	*1835-	*1727-	*1801-	*1835-	*1817-	*1818-	*2418-	*2418-	*2418-	*2418-	*2418-	*2418-	*2418-	*2107-	*2107-		
ONONDAGA	LIMESTONE CHERT	2220-	2273-	1954-	2030-	2048-	2048- B65 B1anc 2245-2280	2244-	2244-	2248-	2063-	2060-	2060-	2060-	2060-	2060-	2060-	2396-	2396-		
ORISKANY	Absent	2515-2528	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	2500-2512 Gas 0202-02506	2503-2516 Gas 0202-02506	2503-2516 Gas 0202-02506	2503-2516 Gas 0202-02506	2503-2516 Gas 0202-02506	2503-2516 Gas 0202-02506	2503-2516 Gas 0202-02506	2503-2516 Gas 0202-02506	Absent	Absent	
HELDERBERG	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent		
KEYSER - BASS ISLAND	2490-2618	2528-2578	2204-2324	2299-2408	2280-2362	2512-2580	2516-2556	2516-2556	2516-2556	2516-2556	2308-	2308-	2308-	2308-	2308-	2308-	2308-	2641-2768	2641-2768		
SALINA	2618-2671	2633-2686	2324-2371	2408-2460	2416-2467	2656-2702	2656-2702	2656-2702	2656-2702	2656-2702	2419-	2419-	2419-	2419-	2419-	2419-	2419-	3365-3418	3365-3418		
GUELPH - LOCKPORT	3003-	3001-	2688-	2770-	2782-	3064-	3064-	3064-	3064-	3064-	2777-	2777-	2777-	2777-	2777-	2777-	2777-	3410-	3410-		
BLACK WATER																		3132-	3132-		
CLINTON	3274-3325	3261-3311	2948-3002	3029-3079	3050-3086	3312-3329	3312-3329	3312-3329	3312-3329	3312-3329	3039-3090	3039-3090	3039-3090	3039-3090	3039-3090	3039-3090	3039-3090	3388-3443	3388-3443		
IRONDEQUOIT	3325-3353	3311-3348	3002-3030	3079-3108	3086-	3329-3408	3329-3408	3329-3408	3329-3408	3329-3408	3090-3121	3090-3121	3090-3121	3090-3121	3090-3121	3090-3121	3090-3121	3836-3862	3836-3862		
MEINDEN	3335-3346	3349-	3030-	3108-	3111-	3408-	3408-	3408-	3408-	3408-	3121-	3121-	3121-	3121-	3121-	3121-	3121-	3468-3560	3468-3560		
WHIRLPOOL	Gas 0334-3466 3514- Gas	Gas 0335-3459 3481- Gas	Gas 03048-3141 3177- Gas	Gas 03140-3225 3242- Gas	Gas 03137-3224 3262- Gas	Gas 0340-3512 3556- Gas	Gas 0340-3512 3556- Gas	Gas 0340-3512 3556- Gas	Gas 0340-3512 3556- Gas	Gas 0340-3512 3556- Gas	Gas 0364-3912 3266-3280 Gas	Gas 0364-3912 3266-3280 Gas	Gas 0364-3912 3266-3280 Gas	Gas 0364-3912 3266-3280 Gas	Gas 0364-3912 3266-3280 Gas	Gas 0364-3912 3266-3280 Gas	Gas 0364-3912 3266-3280 Gas	Gas 0364-3912 3266-3280 Gas	Gas 0365-3658 3625-3658 Gas	Gas 0365-3658 3625-3658 Gas	
QUEENSTON	3524-	3505-	3193-	3273-	3284-	3576-	3576-	3576-	3576-	3576-	3280-	3280-	3280-	3280-	3280-	3280-	3280-	4046-	4046-	4046-	
TOTAL DEPTH	3591	3600	3248	3349	3340	2580	2580	2580	2580	2580	3365	3365	3365	3365	3365	3365	3365	4095	4095	3735	
DEEPEST FORMATION REACHED	Queenston	Queenston	Queenston	Queenston	Queenston	Queenston	Queenston	Queenston	Queenston	Queenston	Queenston	Queenston	Queenston	Queenston	Queenston	Queenston	Queenston	Queenston	Queenston	Queenston	
RESULT	1,700 Mcf AF 925 psi/10 days development Goddard pool Erie field	551 Mcf AF 1,040 psi/10 days development Horbury pool North East field	149 Mcf AF 844 psi/10 days extension Harborcreek pool Erie field	185 Mcf AF 765 psi/10 days development Harborcreek pool Erie field	1,800 Mcf AF 810 psi/10 days development Burke's pool Erie field	2,700 Mcf AF 810 psi/10 days development Burke's pool Erie field	149 Mcf AF 810 psi/10 days development Burke's pool Erie field	149 Mcf AF 810 psi/10 days development Burke's pool Erie field	149 Mcf AF 810 psi/10 days development Burke's pool Erie field	1,800 Mcf AF 810 psi/10 days development Burke's pool Erie field	2,000 Mcf AF 1,210 psi/10 days development Bartoli's pool North East field	2,000 Mcf AF 1,210 psi/10 days development Bartoli's pool North East field	3,600 Mcf AF 1,165 psi/10 days development Hornby pool North East field								

Figure 33. (Continued)

OIL AND GAS DEVELOPMENTS IN 1979

COUNTY	Permit Number	Erie 20612	Erie 20688	Erie 20597	Erie 20691	Erie 20761	Erie 20586	Erie 20572	Erie 20554	Erie 20738	Erie 20640
NAME OF WELL		Webster Halloran	Harborcreek Twp. #1	Norman Hatch	Geraldine Hicks	Geraldine Hicks #1-A	Gary Hoover	John Johnson	Charles Johnston #1	R. Jones #1	Robert Jordan #1
OPERATOR		Hanley & Bird	Appalachian Energy, Inc.	Envirogas, Inc.	Envirogas, Inc.	Envirogas, Inc.	Envirogas, Inc.	Envirogas, Inc.	Envirogas, Inc.	Envirogas, Inc.	Envirogas, Inc.
TOWNSHIP		Vanango	Harborcreek	Wayne	Fairview	Fairview	Harborcreek	Harborcreek	North East B 161	North East B 211	North East C 207
QUADRANGLE & MAP NUMBER	MAP	North East H 217	North East D 184 **Harborcreek	Corry B 37 **Corry	Erie G 140 **Swainville	North East D 140 **Harborcreek	North East D 170 **Harborcreek	North East D 170 **Harborcreek	North East B 211	North East B 211	North East C 207
LATITUDE		6,400 ft. S 42°05'00"	7,050 ft. S 42°10'00"	2,710 ft. S 42°00'00"	2,250 ft. S 42°02'39"	2,150 ft. S 42°02'39"	12,940 ft. S 42°10'00"	14,750 ft. S 42°15'00"	9,800 ft. S 42°12'30"	5,300 ft. S 42°16'25"	
LONGITUDE		880 ft. N 79°50'00"	2,550 ft. N 79°57'30"	6,200 ft. N 80°12'39"	6,100 ft. N 80°12'39"	8,010 ft. N 79'55'00"	700 ft. N 79°57'30"	3,050 ft. N 79°52'30"	400 ft. N 79°50'00"	11,000 ft. N 79°45'00"	
DATE COMPLETED		9-6-79	1-10-79	10-24-78	2-28-79	3-23-79	9-24-78	11-10-78	12-6-78	8-16-79	11-29-78
ELEVATION		1336 ft	814 ft	1764 ft	823 ft	823 ft	1069 ft	1015 ft	754 ft	1204 ft	604 ft
TALLY							*1378-	*1669-	*1532-	*1711-	* 915-
ONONDAGA LIMESTONE	CHERT	*2390-	1588-		1584-	1584-	1901-	1901-	1385-1633	1336-	1146-1349 Bois Blanc 1349-1386
ORISKANY		Absent	Absent		1049-1866	1849-1866	Absent	Absent	2179-2190	Absent	Absent
HELDERBERG		Absent	Absent		Absent	Absent	Absent	Absent	2179-2190	Absent	Absent
KYSER-BASS ISLAND		1835-1949		1865-1988	1866-1988	1866-1988	2161-2267	2069-2188	1633-1738	2190-	1398-1470
SUNINA		1949-		1988-	1988-	1988-	2267-	2188-	1738-	2293-	1470-
GIELPH-L-LOCKPORT		2314-		2414-	2414-	2414-	2629-	2547-2812	2087-	2653-	1834-
BLACK WATER											
CINTON		2571-2622		2680-2726		2680-2726	2894-2942	2812-2866	2347-2399	2911-2966	2100-2147
IRONDEOUQUIT	3443-	2622-2663		2725-		2725-	2942-2959	2886-2914	2359-2446	2966-	2147-
MEDINA	3460-	2663-	*4328-1-4415	Gas 0668-2750	Gas 0668-2750	Gas 0668-2750	2963-	2914-	2416-	2990-	2171-
WHIRLPOOL	Gas 3618-	2977 Gas	4468-Gas	2977 Gas	2977 Gas	2977 Gas	Gas 0305-3080	Gas 0396-3005	Gas 0449-2521	Gas 0302-3106	Gas 02197-2275
QUEENSTON	3629-	2812-	4684-	2924-			3132-	3057-	2568-	3156-	2332-
TOTAL DEPTH		3656	2880	4582	2990	2465	3216	3121	2661	3238	2402
DEEPEST FORMATION REACHED		Queenston	Queenston	Queenston	Queenston	Lockport	Queenston	Queenston	Queenston	Queenston	Queenston
RESULT		70 Mcf AF 950 psi/48 hrs. New pool/	1,100 Mcf AF 715 psi/10 days discovery	465 Mcf AF 1,060 psi/72 hrs. Discovery	Junked and abandoned development	Junked and abandoned development	78 Mcf AF 693 psi/10 days development	449 Mcf AF 770 psi/10 days development	558 Mcf AF 640 psi/10 days development	3,600 Mcf AF 655 psi/10 days development	
		Half Moon pool	Harborcreek pool	Briarfield Erie field	Fairview pool Erie field	Harborcreek pool	Harborcreek pool Erie field	Burgess pool Erie field	Orchard Beach pool Erie field	Orchard Beach pool Erie field	North East field

SUMMARIZED RECORDS OF DEEP WELLS

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COUNTY	Permit Number	Erie	Erie	Erie	Erie	Erie	Erie	Erie	Erie	Erie	Erie	Erie
NAME OF WELL	Edward Kearney #1	20679	20669	20589	20632	20588	20754	20818	20772	20687	20557	Erie
OPERATOR	Envirogas, Inc	B & G Gas Company	John Koehler #1	John Kolstee #1 (AE-29)	John Kolstee #1 (AE-31)	Gene Kowalski #1	Gene Kowalski #2	Joseph Kowalski #1	John Kozlowski #1	John Kozlowski #1	Walter Kuhl #1	Walter Kuhl #1
TOWNSHIP	Greene	Connacht	Greene	Wayne	Wayne	Greenfield	Greenfield	Greenfield	Harbortreek	Envirogas, Inc	Envirogas, Inc	Envirogas, Inc
QUADRANGLE & MAP NUMBER	North East G 197 **Connachtville	Erie E 136 **Erie South	Corry B 40 **Corry Columbus	Corry B 38 **Corry	North East E 205 **Hammett	North East E 224 **Hammett	North East E 206 **Hammett	North East E 208 **Hammett	North East 0 198 **Harbortreek	North East D 137 **Hammett	North East D 137 **Hammett	North East D 137 **Hammett
LATITUDE	8.875 ft. S 42°05'00" W 79°57'30"	8.550 ft. S 41°52'30" W 79°57'30"	9,650 ft. S 42°05'00" W 80°00'00"	4,400 ft. S 42°00'00" W 79°35'30"	5,310 ft. S 42°00'00" W 79°37'30"	2,050 ft. S 42°07'30" W 79°52'30"	950 ft. S 42°07'30" W 79°52'30"	350 ft. S 42°07'30" W 79°52'30"	5,750 ft. S 42°10'00" W 79°55'00"	9,250 ft. S 42°07'30" W 79°55'00"	9,250 ft. S 42°07'30" W 79°55'00"	9,250 ft. S 42°07'30" W 79°55'00"
LONGITUDE	13-79	12-24-78	1114 OF	1410 KB	11-25-70	8-31-78	10-10-78	4-18-79	8-16-79	6-1-79	2-1-79	8-14-78
DATE COMPLETED												
ELEVATION	1340 KB				1442 KB	1799 DF	1480 KB	1465 GR	1490 KB	854 KB	1385 KB	
TULLY	*2012-	*2086-	*2087-				*2118-	*2115-	*2113-	*1402-	*2036-	
ONONDAGA LIMESTONE	2240- CHERT	2260-	2316-				2348-	2350-	2344-	1630-	2268-	
ORISKANY	Absent	Absent	Absent	2572-2585 show			Absent	2605-	2588-2600	Absent	Absent	Absent
HELDERBERG	Absent	Absent	Absent				Absent	Absent	Absent	Absent	Absent	Absent
KEYSER-BASS ISLAND	2490-	2592-	2585-2713				2549-2716	2605-2754	2600-2701-	1875-1990	2460-2855	2460-2855
SALINA	2624-		2713-				2716-	2754-	3077-	3074-338	3074-338	3074-338
QUELPH-LOCKPORT BLACK WATER	3026-	3108-	3096-				3052-	3052-	3052-	3052-	3052-	3052-
CLINTON	3290-3337	3353-3449	3345-3414				3333-3386	3342-3388	3338-3388	3338-3388	3338-3388	3338-3388
IRONDEOUIT	3337-3381	3449-3479	3414-3441				3386-3414	3388-3416	3388-3416	3388-3416	3388-3416	3388-3416
MEDINA	Gas 3381-1533	Gas 3479-3612	Gas 3441-3569	*4040-Gas 4116-4146	*4040-Gas 4120- Gas	3414-Gas 3446-4473	3414-Gas 3562-3579	3416-Gas 3543-3577	3416-Gas 3563- Gas	2688-Gas 3566-3579	2688-Gas 3566-3579	3390-Gas 3512-Gas
WHIRLPOOL	Gas 3523-3535	Gas 3654-3660	Gas 3595-Gas									
QUEENSTON	3535-	3660-	3616-				4539-	3579-	3581-	3579-	2848-	3530-
TOTAL DEPTH	3609	3688	3705	4323	4688	3663	3656	3665	3665	2930	3606	
DEEPEST FORMATION REACHED	Queenston	Queenston	Queenston	Queenston	Queenston	Queenston	Queenston	Queenston	Queenston	Queenston	Queenston	Queenston
RESULT	366 Mcf AF 1,000 psi extension Goodard pool Erie field	857 Mcf AF 1,075 psi/28 days development Lundy's Lane pool Connacht field	700 Mcf AF 962 psi/10 days new pool discovery Brokentraw field	782 Mcf AF 1,041 psi/10 days development Brokentraw field	1,200 Mcf AF 960 psi/10 days development Hornby pool	55 Mcf AF 920 psi/10 days new pool development Hornby pool	55 Mcf AF 635 psi/10 days development Brokentraw field	55 Mcf AF 920 psi/10 days new pool development Hornby pool	55 Mcf AF 920 psi/10 days new pool development Brokentraw field	55 Mcf AF 920 psi/10 days new pool development Hornby pool	55 Mcf AF 920 psi/10 days new pool development Brokentraw field	55 Mcf AF 920 psi/10 days new pool development Hornby pool

Figure 33. (Continued)

COUNTY	Permit Number	Erie	Erie	Erie	Erie	Erie	Erie	Erie	Erie	Erie	Erie
NAME OF WELL	Lakeport Realty #1	20502	Erie 20621	Erie 20592	Erie 20706	Erie 20329	Erie 20735	Erie 20881	Erie 20798	Erie 20831	Erie 20636
OPERATOR	Lakeport Realty	Arthur Larson #2	Warren Lechner #1	Ray Lyons #1	Thomas L. Mammarelli #1	George Mason #1	Helen McClure #1	Richard McIntosh, et al #1	George & Shirley McLaughlin #1	N. E. A. Cross Company	Richard Neeh #1
TOWNSHIP	CITY OF ERIE	North East	North East	Envirogas, Inc	Envirogas, Inc	Envirogas, Inc	Envirogas, Inc	Envirogas, Inc	Vineyard Oil & Gas Company	LeBeouf	Envirogas, Inc
QUADRANGLE & NUMBER	MAP E 137 *Erie South	North East B 142 **Harbortreek	North East B 0 153 **North East	Greenfield	LeBeouf	Girard	Greenfield	North East B 214 **North East	Union City D 41 **Waterford	North East B 156 **North East	
LATITUDE	41°45' ft. S 42°07'30" N	6,450 ft. S 42°12'30" N	9,100 ft. S 42°10'00" N	4,900 ft. S 42°10'30" N	9,650 ft. S 41°55'00" N	2,250 ft. S 42°02'30" N	8,750 ft. S 42°10'00" N	15,100 ft. S 42°15'00" N	14,100 ft. S 41°55'00" N	17,000 ft. S 42°12'30" N	
LONGITUDE	87°00' ft. W 80°05'00" E	1,450 ft. N 79°52'30" E	6,900 ft. N 79°50'00" E	10,550 ft. N 79°50'00" E	3,950 ft. N 79°55'00" E	650 ft. N 80°17'30" E	10,650 ft. N 79°50'00" E	4,200 ft. N 79°50'00" E	6,350 ft. W 79°55'30" E	6,800 ft. W 79°50'00" E	
DATE COMPLETED	9-25-78	10-14-78	11-14-78	7-13-79	7-31-79	6-5-79	10-10-79	6-26-79	7-27-79	11-23-78	
ELEVATION	685 KB	805 KB	960 KB	1360 KB	1254 D.F.	690 GR	1430 GR	794 KB	1194 D.F.	794 KB	
TULLY	*1270-	*1275-	*1460-	*1962-	*2020-	*1216-	*2031-	*1206-	*2396-	*1246-	
ONONDAGA LIMESTONE CHERT	1450-1674	1493-1733	1682-1924	2160-2410	2636-3386	1429-	2256 Bois Blanc 2450-502	1441-	2616-	1469-	
ORISKANY	Absent	Absent	Absent	2410-2420	Absent	1703-1723	Absent	Absent	Absent	Absent	
HEIDERBERG	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	
KEYSER-BASS ISLAND	1674-1818	1733-1845-	1924-2034	2420-2521	1723-1886	2502-2585	1701-1852	3342-	Absent	1709-1822	
SALINA	1818-1871	2034-2079	2521-2572	3388-3442	1888-	2608-2664	1852-	3342-	3342-	1867-	
GUELPH-LOCKPORT BLACK WATER	2250-	2204-	2396-2652	2884-	3442-	2252-	2900-	2245-	3376-	2174-	
CLINTON	2470-2502	2460-2514	2662-2706	3150-3195	3832-3856	2510-2558	3239-3294	3208-	3208-	2432-2486	
IRONDEQUOT	2502-2551	2514-	2706-2754	3195-3224	3832-3856	2558-	3294-	3247-	3766-	2486-	
MEDINA	2551- Gas #0254-2694	2550- Gas #0254-2697	2654- Gas #0254-2709	3224- Gas 0279-2842	3856- Gas 03248-3104	2590- Gas 0259-2686	3321- Gas 03343-3443	2489- Gas 02519-2554	3806- Gas 0354-3918	2525-	
WHIRLPOOL	2660-2697	Gas 0254-2694	2688-2709	Gas 2821-2898	3366-3384	Gas 4030-4042	2740-2756	Gas 3421-3488	Gas 3988-3998	Gas 0537-2635	
QUEENSTON	2697-	2709-	2788-	3384-	4042-	2756-	3488-	2652-	3998-	2674-	
TOTAL DEPTH	2752	2785	2968	3478	4094	2855	3579	2726	4070	2758	
DEEPEST FORMATION REACHED	Queenston	Queenston	Queenston	Queenston	Queenston	Queenston	Queenston	Queenston	Queenston	Queenston	
RESULT	750 Mcf AF 720 psi/6 days development Chatter Oak pool Erie field	1,750 Mcf AF 660 psi/10 days development Burgess pool North East	2,500 Mcf AF 765 psi/10 days development Burgess pool North East	2,000 Mcf AF 970 psi/10 days development Burgess pool North East	111 Mcf AF 830 ps/10 days development Waterford pool Erie field	1,500 Mcf AF 1,025 ps/10 days development Burgess pool North East	2,300 Mcf AF 1,210 psi/10 days development Orchard Beach pool	2,900 Mcf AF 800 psi/10 days development Orchard Beach pool	2,900 Mcf AF 1,210 psi/10 days development Orchard Beach pool	2,900 Mcf AF 800 psi/10 days development Orchard Beach pool	

SUMMARIZED RECORDS OF DEEP WELLS

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COUNTY	Permit Number	Erie	Erie	Erie	Erie	Erie	Erie	Erie	Erie	Erie	Erie	Erie	Erie	Erie
NAME OF WELL	X. Mehl #1	X. Mehl #2	Eugene & Ernestine Mitchell #1	Eugene & Ernestine Mitchell #2	Eugene & Ernestine Mitchell #1	Eugene & Ernestine Mitchell #2	William Mong #1	Leon Morton #2	Glenn Murphy #1	Alex Kletupski #1	John Ronan #1	Carl J. Norder #1	Erie 2017	Erie 2017
OPERATOR	Envirogas, Inc	Envirogas, Inc	Envirogas, Inc	Envirogas, Inc	Envirogas, Inc	Envirogas, Inc	Envirogas, Inc	Envirogas, Inc	Envirogas, Inc	Envirogas, Inc	Envirogas, Inc	Envirogas, Inc	Erie 20660	Erie 20660
TOWNSHIP	North East	North East	Waterford	Waterford	Greenfield	Wayne	North East	Greenfield	Green	North East	G 218	North East	G 169	Harborcreek
QUADRANGLE & MAP NUMBER	North East B 187	North East B 227	Union City A 29	Union City A 44	North East E 231	Union City C 45	North East B 196	North East E 193	North East F 191	**Hartburg	**Hartburg	**Hartburg	**Hartburg	**Hartburg
LATITUDE	42°19'12.30"N	42°19'12.30"N	**Waterford	**Waterford	**Waterford	Union City	5,500 ft. S	4,200 ft. S	2,500 ft. S	7,405 ft. S	7,405 ft. S	5,405 ft. S	5,405 ft. S	5,405 ft. S
LONGITUDE	79°50'00"W	79°50'00"W	9,200 ft. S	9,000 ft. S	9,500 ft. S	9,420 ft. 00"	42°05'30"N	42°05'30"N	42°07'30"N	42°12'30"N	42°12'30"N	42°12'30"N	42°12'30"N	42°12'30"N
DATE COMPLETED	3-16-79	8-30-79	9,450 ft. S	9,450 ft. S	9,450 ft. S	9,450 ft. S	7,200 ft. W	100 ft. W	7,300 ft. W	2,100 ft. W	2,100 ft. W	1,400 ft. W	1,400 ft. W	1,400 ft. W
ELEVATION	1000 GR	1150 GR	1266 kB	1264 OF	1250 OF	1244 OF	1690 GR	1690 GR	1690 GR	1460 kB	1305 GR	1305 GR	1305 GR	1305 GR
TULLY	*1521-	*1677-					*1856-	*2691-	*1334-	*2120-	*2016-	*1131-	*1131-	*1131-
ORIGIN	LIMESTONE	1745-	1988- Bois Blanc 2102-2153	2350-	206- Bois Blanc 2299-2351	2932-	2932-	1556-	1556-	2351-	2351-	1348-	1348-	1348-
ONONDAGA	CHERT													
ABSENT	Absent	Absent	Absent	Absent	Absent	3158-3180	Absent	Absent	Absent	2492-2506	Absent	Absent	Absent	Absent
HELMERBERG	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent
KEYSER-BASS ISLAND	1995-2098	2153-	2351-	3180-	3180-	3303-	3303-	1810-	1810-	2611-2704	2506-2635	1599-1699	1599-1699	1599-1699
SALINA	2098-	2266-	2461-	3303-	3303-	3770-	3770-	1916-	1916-	2704-	2635-	1699-	1699-	1699-
GUELPH-LOCKPORT	2450-	2612-	2828-	2828-	2828-	2828-	2828-	2256-	2256-	3073-	3073-	3010-	3010-	3010-
BLACK WATER														
CLINTON	2707-2762	2871-	3088-	4040-4092	2517-2568	3337-3384	3337-3384	3337-3384	3337-3384	3337-3384	3337-3384	3252-3317	3252-3317	3216-3268
IRONDEQUOIT	2762-2805	2924-	3144-	4092-4142	2568-	3384-3413	3384-3413	3384-3413	3384-3413	3384-3413	3384-3413	3317-3364	3317-3364	3317-3364
MEDINA	2805-	2850-	3600-	4124-	2513-	3413-	3413-	3413-	3413-	3413-	3413-	3361-3462	3361-3462	32409-
WHIRLPOOL	Gas 02809-2901	Gas 02927-3056	Gas 0365-3705	Gas 04126-4235	Gas 04615-2705	Gas 0345-3523	Gas 0345-3523	Gas 0345-3523	Gas 0345-3523	Gas 0345-3523	Gas 0345-3523	Gas 0365-3541	Gas 0365-3541	Gas 02423-2507
QUEENSTON	2933-	3116-	3769-	3334-	3334-	4292-	4292-	2788-	2788-	3576-	3576-	3514-	3514-	2560-
TOTAL DEPTH	3030	3188	3850	3882	3427	4368	4368	2845	2845	3666	3666	3563	3563	2629-
DEEPEST FORMATION REACHED	Queenston	Queenston	Queenston	Queenston	Queenston	Queenston	Queenston	Queenston	Queenston	Queenston	Queenston	Queenston	Queenston	Queenston
RESULT	6,400 Mcf AF 765 psi development Burgess pool North East field	90 Mcf AF 790 psf/10 days development Burgess pool North East field	733 Mcf AF 1,200 psf/18 days development Waterford pool Erie field	551 Mcf AF 975 psf/10 days development Waterford pool Erie field	4,000 Mcf AF 850 psi development Burgess pool North East field	518 Mcf AF 995 psf/10 days development Hornby pool North East field	518 Mcf AF 1,035 psf/10 days development Goddard pool North East field	518 Mcf AF 1,035 psf/10 days development Burgess pool North East field	518 Mcf AF 1,035 psf/10 days development Hornby pool North East field	518 Mcf AF 1,035 psf/10 days development Goddard pool North East field	518 Mcf AF 1,035 psf/10 days development Hornby pool North East field	518 Mcf AF 1,035 psf/10 days development Goddard pool North East field	518 Mcf AF 1,035 psf/10 days development Hornby pool North East field	

Figure 33. (Continued)

COUNTY	Permit Number	Erie	Erie	Erie	Erie	Erie	Erie	Erie	Erie	Erie	Erie
NAME OF WELL	Algis Norvasia #1	20564	20702	20642	20622	20629	20626	20627	20683	20553	Erie 20580
OPERATOR	Algis Norvasia	Thaddeus Octs #1	G. R. Orton #1	Richard Osborne #1	George Peck #1	Marion Pierce #2	Marion Pierce #3	Quality Heat Treat Corporation #1	Raymond Querryd #1	Richard Querryd #1	Richard Querryd #1 (NE-35)
TOWNSHIP	North East	Harborcreek	North East	North East	North East	Greenfield	Greenfield	City of Erie	Appalachian Energy, Inc	Appalachian Energy, Inc	Appalachian Energy, Inc
QUADRANGLE & NUMBER	North East B 151	North East D 208	North East C 157	North East C 154	North East C 155	North East E 143	North East E 171	Erie F 139	Corry B 33	Corry B 33	Corry B 35
DEPTH	3,290 ft. S	4,200 ft. S	4,200 ft. S	4,200 ft. S	3,575 ft. S	14,400 ft. S	12,900 ft. S	*Erie North	**Corry	**Corry	**Corry
LONGITUDE	79°50'00" W	79°47'30" W	79°47'30" W	79°47'30" W	79°52'30" W	4,900 ft. W	13,400 ft. S	14,200 ft. S	42°10'00"	42°10'00"	42°00'00"
DATE COMPLETED	8-3-78	2-27-79	11-19-78	10-8-78	11-17-78	10-27-78	11-6-78	11-6-78	2-3-79	8-6-78	3-31-78
ELEVATION	904 kB	1180 kB	710 kB	910 kB	714 kB	1430 kB	1460 GR	709 DF	1530 KB	1705 GR	
TYPE	*134-	*172-	*1132-	*1383-	*1102-	*2088-	*2082-				
ONONDAGA	LIMESTONE	1549-	1999-2194 Bois Blanc 2194-2251	1355-	1615-	1332-	2279-	2321-	*1463-		
ORISKANY	CHERT	Absent	Absent	Absent	Absent	Absent	Absent	Absent			
HEIDERBERG		Absent	Absent	Absent	Absent	Absent	Absent	Absent			
KEYSER - BASS ISLAND	SILINA	1703-1852-	2251-2376 2376-	1592-1697-	1858-1978-	1569-1662 1662-	2524-2641 2641-	2575-2686 2686-			
GULPH - LOCKPORT	BLACK WATER	2226-	2737-	2043-	2333-	2015-	3009-	3050-			
CINTON	IRONDEQUOIT	2457-2609 2609-2657	3002-3052-	2303-2355-	2598-2648 2648-2692	2273-2322 2322-2358	3273-3321 3321-3366	3305-3358 3358-3404	2515-		
MEDINA	WHIRLPOOL	Gas 2652-2793 2780-	Gas 03109-3182 3228-	Gas 02404-2480 2820- Gas	Gas 02700-2789 2871- Gas	Gas 02370-2457 2992- Gas	Gas 03381-3466 3497- Gas	Gas 03414-3514 3536- Gas	*4236- 2681- 2681-	*426- Gas 0267-4397 4394- 4400-	*4881- Gas 024502-4392 4392- Gas
QUEENSTON	TOTAL DEPTH	2850	3321	2600	2904	2587	3567	3537	2742	441	4559
DEEPEST FORMATION REACHED	Queenston	Queenston	Queenston	Queenston	Queenston	Queenston	Queenston	Queenston	Queenston	Queenston	Queenston
RESULT	600 Mcf AF 700 psi/5 days development Orchard Beach	1,300 Mcf AF 1,035 psi development Orchard Beach Erie field	782 Mcf AF 738 psi/10 days development Orchard Beach	551 Mcf AF 805 psi/ 10 days development Orchard Beach	302 Mcf AF 676 psi/10 days development Orchard Beach pool	955 Mcf AF 855 psi/10 days development Orchard Beach pool	756 Mcf AF 900 psi/10 days development Orchard Beach pool	756 Mcf AF 900 psi/10 days development Orchard Beach pool	1,200 Mcf AF 1,250 psi/72 hrs. extension Brookshaw field	650 Mcf AF 1,250 psi/72 hrs. extension Brookshaw field	

SUMMARIZED RECORDS OF DEEP WELLS

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Figure 33. (Continued)

OIL AND GAS DEVELOPMENTS IN 1979

COUNTY	Permit Number	Erie	Erie	Erie	Erie	Erie	Erie	Erie	Erie	Erie	Erie
NAME OF WELL	Donald Seymour #1	Erie 20667	Erie 20684	Erie 20582	Erie 20668	Erie 20716	Erie 20661	Erie 20787	Erie 20682	Erie 20631	
OPERATOR	Envirogas, Inc	J. B. Shunk #1	William Skopow #1	Anthony Slava #1 (AE-30)	John Spaeth #1	Ronald G. Steele #1	James Sul #2	Edmond M. Tinian #1	C. & G. Troyer #3	C. & G. Troyer #5	
TOWNSHIP	North East	Harborcreek	Greenfield	Wayne	North East	Harborcreek	Harborcreek	Fairview	Watervliet	Watervliet	
QUADRANGLE & NUMBER	North East 195 *North East 42°00'00"S	North East D 174 **Harborcreek 42°10'00"S	North East E 181 **Hammett 42°07'30"S	Corry B 41 **Corry 8,150 ft. S 42°00'30"S	North East C 179 **North East 7,350 ft. S 42°16'25"S	North East D 204 **Hammett 4,250 ft. S 42°12'30"S	North East A 162 **Harborcreek 13,400 ft. S 42°02'30"S	Erie G 142 **Savantille 350 ft. S 40°02'30"S	Union City A 34 *Watervliet 12,600 ft. S 41°57'30"S	Union City A 27 **Watervliet 14,600 ft. S 41°57'30"S	
Latitude	42°00'00"S	42°10'00"S	42°07'30"S	42°00'30"S	7,350 ft. S 42°16'25"S	4,250 ft. S 42°12'30"S	13,400 ft. S 42°02'30"S	350 ft. S 40°02'30"S	12,600 ft. S 41°57'30"S	14,600 ft. S 41°57'30"S	
Longitude	84°00'00" W 79°55'00" W	84°00'00" W 79°55'00" W	84°00'00" W 79°52'30" W	84°00'00" W 79°52'30" W	2,530 ft. W 79°37'30" W	3,800 ft. W 79°47'30" W	150 ft. W 79°55'00" W	10,150 ft. W 79°55'00" W	6,700 ft. W 80°02'30" W	10,800 ft. W 79°55'00" W	7,825 ft. W 79°55'00" W
DATE COMPLETED	5-5-79	1-4-79	2-8-79	9-18-78	1-22-79	6-4-79	12-13-78	7-25-79	2-14-79	11-1-78	
ELEVATION	1330 kB	830 GR	1460 kB	1705 kB	634 kB	1215 kB	704 kB	800 GR	1264 kB	1198 kB	
TRAIL	*1891-	*1365-	*2088-	*	*	*1845-	*1181-	*1364-	*220-	*2196-	
ONONDAGA LIMESTONE	Bois Blanc 2308-2351	1592-	2321-		1190-	2062-	1400-	1576-	2402-	2420-	
ORISKANY	2351-2368	Absent	Absent	Absent	2321-2330	Absent	Absent	Absent	Absent	Absent	
HEIDERBERG	Absent	Absent	Absent	Absent	1430-1518	2330-2442	1649-1760	1860-2012	2686-	Absent	
KEYSER-BASS ISLAND	2368-2472	1836-1949	2568-2687	1518-	1518-	2442-	1760-	2012-	2816-	2860-2782	
SLINA	2472-	1949-	2687-	1872-	1872-	2812-	2113-	2376-	3338-	2787-3312	
GULPH-LOCKPORT BLACK WATER	2838-	2888-	3052-							3312-	
CINTON IRONDEQUOIT	3092-3147	2563-2618	3323-3364	2132-2182	3078-3129	3128-3146	3159-2422	2655-2704	3550-3663	3523-3630	
MEDINA WHIRLPOOL	3147-3164	2663-	3364-3411	2818-2224	3182-2224	3182-2224	2422-2464	2704-2730	3663-3694	3660-3660	
QUEENSTON	3338-	2810-	3556-	*3404-Gas 0341-4492 Gas 5536-Gas	*3404-Gas 0433-4464 Gas 2349-	3146-Gas 03176-3322 Gas 3310-	2444-Gas 0475-2559 Gas 2559-	2730-Gas 0475-2862 Gas 2893-Gas	3664-Gas 0375-3811 Gas 3838-Gas	3660-Gas 0368-3760 Gas 3826-Gas	
TOTAL DEPTH	3404	2898	3635	4555	2844	3402	2684	2981	3928	3938	
DEEPEST FORMATION REACHED	Queenston	Queenston	Queenston	Queenston	Queenston	Queenston	Queenston	Queenston	Queenston	Queenston	
RESULT	95 Mcf AF 837 psi 600 psi/10 days development Burgess pool North East	950 Mcf AF 600 psi/10 days development Harborcreek pool North East	750 Mcf AF 1,100 psi/12 hrs. development Hornby pool North East	782 Mcf AF 650 psi/10 days development Brokentraw field	55 Mcf AF 686 psi/10 days development extension	510 Mcf AF 686 psi/10 days development	500 Mcf AF 820 psi/10 days development	1,600 Mcf AF 1,100 psi/4 days development	2,500 Mcf AF 1,100 psi/4 days development	Queensland	

SUMMARIZED RECORDS OF DEEP WELLS

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COUNTY	Permit Number	Erie										
NAME OF WELL	G. S. & J. Troyer #2	Erie 20664	Erie 20670	Erie 20653	Erie 20680	Seth Tuttle #1	Seth Tuttle #2	Charles Valone #3	Charles Valone #4	Charles Valone #5	Charles Valone #5-A	Erie 20593
OPERATOR	C. & C. Troyer Brothers	C. & C. Troyer Brothers	C. & C. Troyer Brothers	Envirogas, Inc	Envirogas, Inc	Harborcreek	Harborcreek	Charles L. Valone	Charles L. Valone	Charles L. Valone	Charles L. Valone	Josephine Walter #1
TOWNSHIP	Union	Union	Union	North East	North East	North East C 173	North East 0 180	North East C 146	North East C 147	North East B 135	North East B 148	Greenfield
QUADRANGLE & MAP NUMBER	Union City E 32 **Union City	Union City E 33 **Union City	Union City E 33 **Union City	**Rainton	**Rainton	*North East	Erie 20593					
LATITUDE	12,350 ft. S 41°55'00"	12,600 ft. S 41°55'00"	11,100 ft. S 41°55'00"	4,400 ft. S 42°07'30"	5,150 ft. S 42°15'30"	3,280 ft. S 42°15'00"	4,250 ft. S 42°15'00"	2,450 ft. S 42°12'30"	2,450 ft. S 42°12'30"	2,450 ft. S 42°12'30"	2,300 ft. S 42°07'30"	*Watsburg
LONGITUDE	6,100 ft. W 79°50'00"	3,200 ft. W 79°50'00"	4,500 ft. W 79°50'00"	2,150 ft. W 79°57'30"	900 ft. W 79°57'30"	10,350 ft. N 79°47'30"	8,550 ft. N 79°47'30"	9,150 ft. N 79°50'00"	9,350 ft. N 79°50'00"	9,350 ft. N 79°50'00"	9,850 ft. N 79°50'00"	Envirogas, Inc
DATE COMPLETED	1-20-79	1-13-79	1-5-79	1-22-79	1-25-78	6-24-78	7-3-78	7-19-78	7-19-78	11-17-78	11-17-78	
ELEVATION	1389 ft	1419 ft	1359 ft	1250 ft	1280 ft	603 ft	668 ft	798 ft	798 ft	798 ft	798 ft	1480 ft
TULLY	*2617-	*2690-	*2618-	*1863-	*1882-	*1040-	*1141-	1318-	1346-	1600-1735	1488-	2158-
ONONDAGA LIMESTONE	2896-	2934-	2854-	2090-	2110-	1250-	1250-	1250-	1250-	Lost Hole	Lost Hole	2386-
CHERT												
CRISKEY	Absent											
HELOERBERG	Absent											
KEYSER - BASS ISLAND	3104-	3145-	3078-	2341-2468	2340-2488	1441-1611	1523-1674	1650-	1650-	1650-	1650-	2628-2742
SALINA	3205-	3248-	3179-	2468-	2488-	1611-	1674-	1782-	1782-	1782-	1782-	2742-
GEEELPH-LOCKPORT	3740-	3780-	3710-	2830-	2851-	1965-	2032-	2215-	2215-	2215-	2215-	3112-
BLACK WATER	3962-4066	4010-4112	3919-4038	3096-3119	3111-3148	2180-2215	2245-2248	2407-2503	2407-2503	2407-2503	2407-2503	3356-3422
CINTON	4066-4096	4112-4112	4038-4066	3149-3173	3148-3218	2215-2240	2348-2389	2503-2548	2503-2548	2503-2548	2503-2548	3422-3456
IRONDEQUOT	4096-4105	4132-4142	4066-	3193-3196	3218-	2240-	2389-	2548-	2548-	2548-	2548-	3447-3559
MEDINA	Gas 40157-4105	Gas 04196-4232	Gas 04196-4232	Gas 04119-4167	Gas 03196-289	Gas 03219-3309	Gas 03267-2387	Gas 022407-2545	Gas 022407-2545	Gas 02559-2689	Gas 02559-2689	Gas 03594-3559
WHIRLPOOL	Gas 0464-0483	Gas 4310-Gas	Gas 4232-Gas	Gas 3235-Gas	Gas 2379-	Gas 2622-	Gas 2622-	Gas 3594-3559				
QUEENSTON	4284-	4284-	4244-	3345-	3363-	2402-	2558-	2692-	2692-	2692-	2692-	3615-
TOTAL DEPTH	4348	4324	4320	3409	3452	2538	2620	1735	1735	2736	2736	3711
DEEPEST FORMATION REACHED	Queenston	Whirlpool	Queenston									
RESULT	2,200 Mcf AF 1,200 psi 4 days	1,100 Mcf AF 1,100 psi 6 days	1,450 Mcf AF 1,100 psi 4 days	1,100 Mcf AF 898 psi 10 days	1,100 Mcf AF 845 psi 10 days	1,100 Mcf AF 760 psi 72 hrs.	782 Mcf AF 870 psi / 10 days					
	development New Ireland field	development New Ireland field	extension New Ireland field	development New Ireland field	development New Ireland field	development New Ireland field	development New Ireland field	development New Ireland field	development New Ireland field	development New Ireland field	development New Ireland field	development New Ireland field
												extension New Ireland field
												North East field

Figure 33. (Continued)

COUNTY	Permit Number	Erie 20763	Erie 20648	Erie 20573	Erie 20608	Erie 20560	Erie 20551	Forest 22185	Forest 22182	Indiana 24710	Indiana 24319
NAME OF WELL	N. M. Waterhouse #1 (NE-50)	Rodney Watrous #1	Dale Villatts #1	K. S. Wise #3	K. S. Wise #3	Kenneth Yost #2	Kenneth Yost #2	Lot 5200 Nov-0001	Lot 5202 Nov-0201	Marlin L. Laney #1	Joseph Venovic #1
OPERATOR	Doran and Associates, Inc.	Appalachian Energy, Inc.	Envirogas, Inc.	N.E.A. Cross Company	Envirogas, Inc.	Envirogas, Inc.	Envirogas, Inc.	John A. Vertullo	Felmont Oil Corporation	Felmont Oil Corporation	Felmont Oil Corporation
TOWNSHIP	Wayne	Harborcreek	Leffouen	Greenfield	Greenfield	Hickory	Hickory	Hickory	Hickory	Pine	
QUADRANGLE & NUMBER	Corry B 45 **Corry	Corry B 42 **Corry	North East 0 152 **Harborcreek	Union City 0 26 **Waterford	North East E 138 **Watsburg	North East E 178 **Waterville	Tidigate E 12 **Kellerville	Tidigate E 13 **Kellerville	Tidigate E 12 **Barnsboro	Barnsboro E 42 **Strongstown	Barnsboro D 41 **Strongstown
LATITUDE	3110 ft. S 41°57'30"	7510 ft. S 42°00'00"	15,000 ft. S 42°50'00"	3,850 ft. S 41°55'00"	2,290 ft. S 42°07'30"	2,490 ft. S 42°07'30"	14,750 ft. S 41°37'30"	9,600 ft. S 41°37'30"	3,890 ft. S 40°40'00"	12,150 ft. S 40°37'30"	
LONGITUDE	10,910 ft. N 79°37'30"	5,550 ft. N 79°37'30"	10,950 ft. N 79°55'00"	4,860 ft. N 79°55'00"	4,900 ft. N 79°50'00"	4,870 ft. N 79°50'00"	2,000 ft. N 79°50'00"	7,350 ft. N 78°20'00"	2,210 ft. N 78°50'00"	1,150 ft. N 78°55'00"	
DATE COMPLETED	6-29-79	12-18-78	11-4-78	9-18-78	8-4-78	12-6-78	9-14-78	9-2-78	3-13-79	3-3-79	
ELEVATION	1480 ft	1596 ft	1070 ft	1188 ft	1514 ft	1505 ft	1295 ft	1200 ft	1917 ft	1872 ft	
TULLY			*1661-	*2257-	*2188-	*2200-	3988-	3856-	*234-	*7238-	
ONONDAGA LIMESTONE	CHERT		1890-	2484-	2423-	2430-	4312-	4128-	Gas 79295-8020	Gas 79295-8020	8030-8020
ORISKANY			Absent	Absent	Absent	Absent	4364-	4200-	Gas 80075-8085	Gas 8012-8159	8150-8160-
HELDERBERG			Absent	Absent	Absent	Absent	4380-	4217-	8170?	8180-	
KEYSER-BASS ISLAND			2128-2261	2721-2839	2626-2784	2683-2785					
SALINA			2261-	2839-2338	2784-	2785-					
GUELPH-LOCKPORT			2622-	3338-	3153-	3154-					
BLACK WATER											
CLINTON IRONDEOUA	4400-	2862-	3558-3673	3421-3462	3421-3463						
MEDINA WHIRLPOOL	4153- Gas 4304-4252	2933-	3673-3703	3462-3568	3463-3496						
QUEENSTON	4316	3127-	3703- Gas 0290-3077	3508- Gas 0375-3790	3096- Gas 03527-3598						
TOTAL DEPTH	4347	4040	3202	3928	3743	3734	4401	4245	3185	8252	
DEEPEST FORMATION REACHED	Queenston Medina	Queenston Medina	Queenston	Queenston	Queenston	Queenston	Queenston	Heiderberg	Heiderberg	Heiderberg?	Heiderberg
RESULT	1,000 psi/2 hrs. extension	Pipe twisted off. 24 Mcf AF junked and abandoned	1,140 psi/16 days development	Lost tools, junked and abandoned	16 Mcf F 65 psi/10 days development	Dry and abandoned	Dry and abandoned	1,500 Mcf AF 2,550 psi/63 hrs. development	1,500 Mcf AF 3,180 psi/13 days development	1,500 Mcf AF 3,180 psi/13 days development	1,500 Mcf AF 3,180 psi/13 days development
	Spencer Creek pool	Harborcreek pool	Harborcreek pool	Waterford pool	Waterford pool	New field	New field	Pinetop pool	Pinetop pool	Strongstown pool	Strongstown field
	Corry field	Erie field	Erie field	Hornby pool	Hornby pool	wildcat	wildcat	North East field	North East field	North East field	

SUMMARIZED RECORDS OF DEEP WELLS

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COUNTY	Permit Number	Mercer	Potter	Somerset	Somerset	Somerset	Somerset
NAME OF WELL	Orivere Unit #1	Rose Koci's #1	Marvin Linderman PA Dept. F & W Tract #15	Oale S. Barron Unit #1	Edward Kirk Gas Unit #1	Earl R. Naugle Gas Unit #1	State Forest & Park Lands #924-1
OPERATOR	Cyclops Corporation	Cyclops Corporation	Consolidated Gas Supply Corporation	Amoco Production/UGI Corporation	Amoco Production/UGI Corporation	Loudon Properties/UGI Corporation	Amoco Production/UGI Corporation
TOWNSHIP	South Pymatuning	Stewardson	Stewardson	Stonycreek	Milford	Middlecreek	Somerset
QUADRANGLE & NUMBER	MAP 15 **Shenango 6 1/2" **Shadyside 15 1/2"	Renovo West C 232 Renovo West C 233 **Tamarack 6 1/2"	Renovo West C 232 Somerset 6 3/4" **Bakersville 5 1/2"	Winder 8 11 **Rockwood 5 1/2"	Winder 8 10 **Hooversville 5 1/2"	Dongal 1 3/4" **Seven Springs 5 1/2"	Somerset H 3 1/2" **Bakersville 5 1/2"
LATITUDE	41°17'30" N	41°30'00" N	41°30'00" N	40°50'00" N	39°57'30" N	40°52'30" N	40°02'30" N
LONGITUDE	80°27'30" W	80°30'00" W	80°30'00" W	79°45'00" W	78°52'30" W	78°52'30" W	79°07'30" W
DATE COMPLETED	9-7-79	8-25-79	5-17-79	6-1-79	1-14-79	2-22-79	7-8-79
ELEVATION	913 ft	1138 ft	1758 ft	1692 ft	2158 ft	2235 ft	2095 ft
TULLY				5308-	*7774-	*7813-	*7876-
ONONDAGA LIMESTONE	3042-	3238-	6422-	6108-	8529-	8673-	*Marcellus 8020-56 @7729-750,
CHERT					8548-	8708-	7830
ORISKANY	3239-3261	3440-	6438-	6121-	8666- Gas @8669-8759	8570- Gas @8634-8764	8920- Gas @8920-8936
HELDERBERG				6146-	8750-	8767-	9030-
KEYSER-BASS ISLAND	3578-						
SALTNA	3616-						
GUELPH-LOCKPORT BLACK WATER	4466-						
CLINTON IRONDEOUIT	4774-	4825-					
MEINA WHIRLPOOL	4638- Gas @4786-4822 5050-	4998- Gas @4966-5007					
QUEENSTON	4918-	5102-					
TOTAL DEPTH	4976	5142	6545-	6240	8852	8803	9024
DEEPEST FORMATION REACHED	Queenston	Oriskany	Helderberg	Helderberg	Helderberg	Helderberg	Marcellus
RESULT	1,700 Mcf AF 1,550 psi/5 days development Sharon deep pool Sharon field	1,600 Mcf AF 1,500 psi/5 days development Sharon deep pool Sharon field	Storage well Leidy storage pool Leidy field	52,900 Mcf Nat. 3,200 psi/24 hrs. Leidy storage pool Leidy field	1,500 Mcf Nat. 2,000 Mcf AF 4,200 psi/3 days Leidy storage pool Leidy field	900 Mcf Nat. 1,500 Mcf AF 3,384 psi/10 hrs. Leidy storage pool Leidy field	700 Mcf Nat. 1,500 Mcf AF 4,320 psi/2 days Leidy storage pool Leidy field
						Dry development temporarily abandoned Shankville field	Plugged and abandoned development Shade Creek field
							500 Mcf Nat. 1,400 Mcf AF 3,250 psi/24 hrs. extension Somerset West field

Figure 33. (Continued)

COUNTY	Permit Number	Somerset	Somerset	Tioga	Venango	Warren	Washington
NAME OF WELL	20080	20081	20074	25522	25224	27425	21147
OPERATOR	John O. Weaver Gas Unit #1	Helen Wolf Gas Unit #1	Marion B. Payne #1	McCaslin #1	Tasa Corporation #1	Warren Bartsch #1	Edgar Calvert #1
TOWNSHIP	Amoco Production/ UGI Corporation	Amoco Production/ UGI Corporation	Columbia Gas Transmission Corp.	Quaker State Oil Refining Corp.	Peoples Natural Gas Company	Red Leaf Oil Ltd.	Pennzoil Company
QUADRANGLE & MAP NUMBER	Black	Millford	Brookfield	Allegheny	Irwin	Sugarcreek	East Finley
LATITUDE	8,775 ft. S 39°57'30"	8,750 ft. S 39°57'30"	8,750 ft. S 39°57'30"	8,750 ft. S 39°57'30"	8,750 ft. S 39°57'30"	8,750 ft. S 39°57'30"	Claysville H 3 *Prosperity
LONGITUDE	7,500 ft. W 79°05'00"	7,275 ft. W 79°16'00"	7,200 ft. W 79°30'00"	7,290 ft. W 79°32'30"	8,450 ft. W 79°55'00"	7,850 ft. W 79°20'00"	1,600 ft. S 40°05'00"
DATE COMPLETED	5-10-79	5-28-79	10-15-77	3-20-78	10-29-77	9-26-79	9-20-78
ELEVATION	2139 kB	2084 kB	1603 GR	1494 kB	1434 kB	1421 kB	1281 kB
TULLY	*7838-	*7621-	*1841-	*4042-	*4372-	*2862-	*6850-
ONONDAGA	LIMESTONE	8723-	8428-	4980-	4321-	3152-	7095-
	CHERT	8744-	8446-				
ORISKANY		8842-	8558-	5007-	4599-	7324-	
HELDERBERG		9032-	8733-	5028-	4720-	7416-	
KEYSER-BASS ISLAND					4794-		
SALINA					4904-	3690-	
GUELPH-LOCKPORT					5784-	4060-	
BLACK WATER							
CLINTON	IRONDEQUOT			5770-	6238-	4315-	
MEDINA	WHIRLPOOL			5834- Gas 65832-5973 5966-	6350- Gas 65366-6470 65588- Gas	4335- Gas 64370-4378 4490- Gas	
QUEENSTON				5974-	6580-	4510-	
TOTAL DEPTH	9050	8791	5150	6061	6694	4635	7,480
DEEPEST FORMATION REACHED	Helderberg	Helderberg	Helderberg	Queenston	Queenston	Queenston	Helderberg
RESULT	\$10 Mcf Nat. 2,500 Mcf AF 3,450 psi/36 hrs. New field discovery Shamrock field	100 Mcf Nat. 1,500 Mcf AF 3,400 psi/36 hrs. New field discovery Rockwood field	Plugged and abandoned New field discovery Rockwood field	389 Mcf Nat. 75 Mcf AF 800 psi/48 hrs. Deeper pool test Pitfield-Cashup field	50 Mcf Nat. 1,170 psi/8 days Deeper pool test Irwain pool Westley field Plugged and abandoned	58 Mcf Nat. 1,100 Mcf AF 1,800 psi New field discovery Stilwater field producing shallow P8 to 3,000 feet	455 psi/15 hrs. Deeper pool test Prestant Grove field